

Light and Lighting

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One Shilling and Sixpence

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Variety in Street Lighting

IT is impossible to travel very far on the main streets traversing our large cities without finding very noticeably different conditions of lighting in different localities. So far from this variety having any charm, it is often harassing to road users at night and sometimes positively dangerous. London is, unfortunately, a bad offender in this respect. From time to time attention is drawn to this in other publications, as it was recently in the "Evening News," whose motoring correspondent described the prevailing conditions in an article appropriately headed "Glitter and Gloom Under Fickle Lights o' London." Without necessarily standardising a particular method of street lighting and a particular illuminant, surely more energetic action is urgently needed to effect changes which will reduce the present variability of visibility along our main traffic routes. If the brake on progress in this direction is the financial situation of local authorities, is there not a good case for grants to be made from the enormous sum annually obtained by the taxation of road vehicles?

Notes and News

The Approaches to Lighting

The first of the London meetings of the I.E.S. in the new session was held on October 14 when the new president, Dr. W. J. Wellwood Ferguson, presented his presidential address. As we mentioned in the last issue Dr. Ferguson is the first ophthalmologist to hold the office of president since 1923 and his address is therefore of considerable interest.

Lighting problems, said Dr. Ferguson, are full of complexity; satisfactory lighting must be efficient, comfortable, harmless, economic and give a certain degree of aesthetic satisfaction. The problems must, therefore, be approached along several distinct and separate lines—amongst them the physical, physiological and psychological.

In recent years the problems of illuminating engineering have been increased by the widespread introduction of fluorescent lighting and television. The application of fluorescent lighting to special industries such as coal mining, weaving or steel production and the aesthetic problems raised by its effect on such things as food, decorations or the female complexion all call for special consideration.

There are many and varied forms of expression of visual fatigue, frequently called "eyestrain." The assessment of such fatigue is no simple task. It is difficult, for example, to determine how much

of the so-called fatigue is associated with the visual task itself, and how much is due to other factors.

The question of pathological effects from fluorescent lighting is one that has been raised from time to time, more especially on the Continent. The eye is adapted to received and perceive the visible waves but many of the invisible waves enter the eye to greater or lesser

depth and, while not perceived, may cause pathological effects due to the destruction of tissue. Under ordinary conditions no organic lesion of the eye as a result of exposure to visible rays has been established and, again under ordinary conditions, the retina would appear to be immune from fatigue thereby.

So far as the retina is concerned there is no evidence of any lesion being produced by ultra-violet waves. In any case only about 3

per cent. of the shorter waves reach the retina and it is, therefore, extremely unlikely that any pathological effect in the deeper tissues could occur. The emission of ultra-violet light from fluorescent lamps is confined to the longer wave lengths and is in fact less in intensity than that present in daylight in a clear atmosphere. It would seem that the chances of harmful effects from ultra-violet radiation from fluorescent lamps, except under extraordinary conditions, are minimal in the extreme. How far retinal disorders resulting from exposure

Next I.E.S. Meeting in London

The next I.E.S. sessional meeting will take place at the Lighting Service Bureau, 2, Savoy Hill, W.C.2, at 6 p.m. on Tuesday, November 11.

At this meeting three short papers on aspects of factory lighting will be presented and discussed. The papers are: "Principles of Factory Lighting," by Mr. T. S. Jones; "Blended Light," by Mr. S. Anderson, and "Lighting in the Explosives Industry," by Mr. R. W. Middleton and Dr. W. E. Harper.

to the sun's radiation are due to the shorter wave length as opposed to the visible and ultra-violet wave lengths, has not so far been precisely determined.

Dr. Ferguson also mentioned flicker as a subject on which further work was required.

Recapitulating, Dr. Ferguson said that he had endeavoured to indicate the main approaches to the problems of illuminating engineering and had gone into some detail on those with which he was in daily contact. The lighting engineer, he said, seeks for formulae whereby the recommendations of the physiologist may be converted into terms of the illumination, or brightness, necessary for the particular tasks in hand. To the manufacturer the problem is one of designing and constructing the necessary light sources and fittings with which this demand may be met. Whether or not the result is successful depends on many variable factors and while the result may be efficient it may at the same time fail to be either economic or aesthetically satisfying. The artistic approach, he said, is of itself a fascinating study but even more full of pitfalls and vagaries of human variation.

In conclusion Dr. Ferguson said that the Illuminating Engineering Society is the link which can bind all the varied interests together.

Lamp Columns

It is announced that the Council of Industrial Design has assumed responsibility for maintaining a list of approved designs of street lighting columns. Local authorities and other bodies interested are invited to consult the list. The committee appointed by the C.O.I.D. includes a representative of the Road Research Laboratory, a city engineer, an architect, an architectural journalist and four members of the staff of the C.O.I.D.

Since the formation of this committee in January of this year some 100 new designs have been considered of which 52 were referred back to the manufacturers for improvement. We are surprised, to put it mildly, that in a period of

nine months some 100 new designs should be produced. Even if only half of these are going into production the number of different columns available, or which will be available at this rate, would seem to be beyond reasonable requirements even after allowing for those new designs which replace older types.

This reminds us of the man who manufactured holes for lamp columns. He was very proud of the great variety of holes he was able to offer his customers but was very upset when he discovered that rival firms were producing holes, which though not necessarily better than his holes, were at least different. So he got his design staff to produce a new range of holes—and of course his rivals did the same. Eventually, realising that this state of affairs could not continue, the manufacturers got together and to their surprise found that they could meet all requirements with three types of hole which they then continued to make to the benefit of the hole industry.

As there are only two types of roads, as far as street lighting is concerned, there would hardly seem to be the need for a great variety of columns. The same might be said about lanterns, but this note is on columns.

Coronation Lighting

We are told that many private undertakings and public authorities have voted sums of money for special lighting in connection with the Coronation next year and we look forward to seeing our cities, towns and villages more attractive and brighter by night than they have ever been before. For the public there will no doubt be an element of surprise about many of the schemes but the sooner some of the details of many of the larger schemes are made known the easier it will be for other schemes to be fitted in. In London the main feature will, of course, be the Coronation route for which the M.O.W. is preparing schemes. Details of what is to be done along the route and the type of lighting to be installed on public buildings should be released as soon as possible.



Sodium lighting on the Baldock Section of the Great North Road.

Street Lighting in Australia

Many factors, technical and non-technical, have to be taken into consideration when deciding the type of street lighting to be used under different conditions. Many of the problems to be faced in a country the size of Australia would be new to lighting engineers in the United Kingdom.

By S. D. LAY,* F.I.E.S.

scattered centres of population, development has been phenomenal, and Australian airways are acknowledged to be at least the equal of any in the world for safety, speed, comfort, and cheapness: a greater proportion of the population uses them than in any other country.

The Continent of Australia has roughly the same population as Greater London and is expanding rapidly in numbers and activities, so it would be unreasonable to expect services, such as railways or street lighting, to be as highly developed as they are in Great Britain. The rate of development is, however, surprising; it is only made possible by adopting methods suitable to the pace of achievement; some of these methods would not suit British conditions.

In fields where conditions are favourable, such as long-distance air travel between the

It is true that most of the population of Australia is concentrated in the large cities, but these cities cover a much greater area than comparable towns in England. Brisbane, for instance, with a population of 400,000 is larger in area than Greater London. Also the ratio of motor vehicles to population is one of the highest in the world. A traffic count made in Sydney in 1951 showed densities up to 3,250 vehicles per hour on main roads during the evening rush hour.

So the problem of providing adequate street lighting for the expanding communities is a formidable one, and it is aggravated by the same administrative difficulties as retarded main traffic route lighting in Britain

* Ministry of Labour and National Service, Australia.

Fig. 1. View of a street lit by American-designed post top lanterns.



until recently, in that the responsible authorities are numerous and small, corresponding to Municipal and Parish Councils. No Government assistance has been forthcoming except in South Australia, where the State Government has recently borne a large portion of the cost of lighting a dozen miles or so of main highway.

Shortly before the last war the Standards Association of Australia issued a Street Lighting Code. This has had a considerable and beneficial influence on street-lighting practice: the electrical supply authorities endeavour to erect all new installations in compliance with its provisions, although they are by no means always successful, due to the lack of appreciation by local authorities of the contribution adequate street lighting can make to road safety, as well as to the difficulty of financing continuous extensions.

The code was based largely on the Ministry of Transport final report, one of the main differences being that the code has not adopted the rigid division of roads into two classes. Instead, the two main groups, "Traffic Routes" and "Other Streets" have been sub-divided into six and four sub-groups respectively, the lowest traffic route sub-group requiring 1,800 lumens per 100 ft. linear of street. The mounting height on all traffic routes is required to be 25 ft. as a minimum; the maximum average spacing is specified as 180 ft.

The four sub-groups in the "Other Streets" category specify between 120 and 960 lumens per 100 ft. linear at minimum



Fig. 2. Street lantern mounted on a wooden pole which also carries overhead conductors.



Fig. 3. Installation on dual carriageway using 140-watt refractor type sodium lanterns mounted at 26ft. in staggered formation.

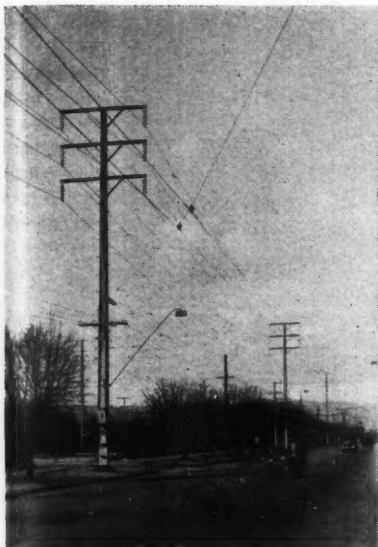


Fig. 4. Showing use of Stobie poles which carry trolley-bus suspension wires as well as street lighting lanterns.

mounting heights varying between 18 and 21 ft. and a maximum spacing of 265 ft. and it is the expressed intention, even in the lowest sub-group, that these widely spaced lanterns should provide as high a road surface brightness as possible. This cannot but result in patchiness and a lack of visibility that demands the use of headlights. This brings about the dangerous condition of alternate direct and silhouette vision which characterises the mixture of inadequate street lighting and car headlights.

The sub-division of the two main classes of street into a total of no less than 10 graded steps, rather than the wide distinction made in the M.O.T. report both in power of lantern and mounting height, is unfortunate not only for the unsatisfactory "semi-traffic-route" lighting which it encourages, but also because the lack of a definite difference in appearance between traffic routes and other streets deprives the motorist of any indication of the streets in which headlights should not be used.

One result of this confusion is the almost invariable practice of driving with dipped headlights throughout urban areas, even in

excellently lit city centres. No doubt this is also partly due to the fact that no campaign has yet been launched to initiate the safer and more comfortable practice of using sidelights only, this in turn being presumably because of the above-mentioned difficulty of recognising the streets where headlights should be extinguished, as well as the fact that there is as yet only a small mileage of adequately lit traffic routes.

Before the issue of the S.A.A. Street Lighting Code (and before the recent great increase in motor traffic) much of the lighting in the better parts of cities and through the parklands, that are a feature of Australian cities, was by means of ornamental post top lanterns of American design. These are attractive in appearance by day and night (Fig. 1), but unless very closely spaced are inadequate for safe traffic route lighting and so are gradually being replaced or supplemented by modern directional equipment.

Installations now being erected mostly comprise incandescent lamps in city shopping and business areas, and discharge lamps



Fig. 5. Use is made of the wide bases of the Stobie poles to indicate street names.



Fig. 6. A trial installation using 400-watt horizontal mercury lamps in refractor lanterns.

on main traffic routes. There is great competition between mercury and sodium as light sources for street lighting, and while honours are fairly evenly divided, local conditions probably more frequently favour sodium, although as in Britain it is not unknown that the choice between the two sources has, on more than a few occasions, been decided by colour preference!

In the shopping areas of the main cities and towns there is a great deal of after-hours shop-window lighting and a stupendous number of luminous tube signs which not only are all too easily confused with traffic lights, but in many cases seriously interfere with the street lighting and in others even take its place. Rundle Street in Adelaide is reputed to have the greatest concentration of shop window and sign lighting in the world; this at any rate is easy to believe, it is certainly a never-to-be-forgotten sight, although the actual street lighting is negligible.

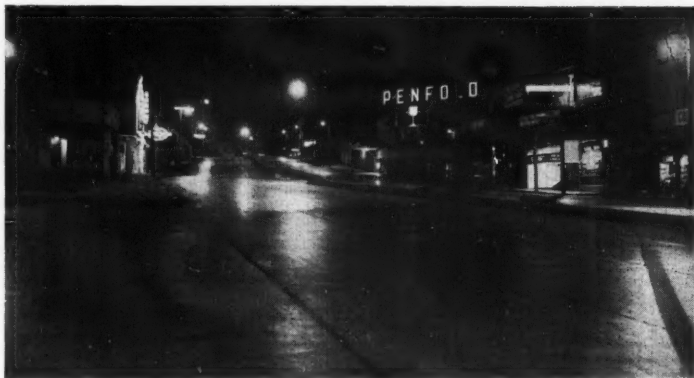
As yet there is no permanent fluorescent street lighting in Australia—although there are some test installations. There appear to be two main reasons for this: firstly, the lanterns must be imported, which with the freightage on such bulky items makes them extremely expensive, and secondly they would require special columns, whereas it is the general practice, except in the centres of the big cities, to mount on either tramway poles or on wooden poles, such as are illustrated in Fig. 2, which also carry the overhead conductors. In the future, no doubt these poles will be replaced, but the present furious pace of development combined with the steel shortage does not allow for the refinements of underground cables and special columns except in a few city

centres such as the brilliantly lit Martin Place in Sydney (Fig. 1) which has 500-watt incandescent lamps in twin ornamental pole-top units mounted in opposite formation at 90-ft. centres. Some idea of the rate of expansion in electricity supply to cope with the country's general development may be gained from the fact that one of the smaller supply authorities has made 10,000 new connections in the past 12 months.

Considerable use is made of span-wire mounting from either poles or buildings. This is particularly the case at intersections, which are very numerous as Australian cities are built on the "square block" plan. These intersections are a severe traffic problem and some local authorities have resorted to the practice of marking them with a different coloured street lamp; the success of the scheme is, however, very doubtful.

The supply of equipment is an ever-present and difficult problem. Some of the simpler types of lantern are made in Australia as well as some metal-work to carry imported refractors, also some reflector type sodium lanterns, but in general, lanterns for discharge lamps and directional equipment for incandescent lamps are imported complete. The economic manufacture of lanterns in Australia is difficult partly because of the present small demand and the lack of experience in design and manufacture, as well as the expense of shipping over long distances, which raises the delivered cost nearly as high as that of the imported product. These facts are reflected in street-lighting tariffs—as an example of actual annual charges in one State in 1950, one mile of street lighting, consisting of 33 400-watt mercury lamps in

Fig. 7. The Pacific Highway, Sydney, where 400-watt mercury lamps in refractor fittings are used.



vertical refractor lanterns on wood poles with overhead conductors cost £850. Costs have risen considerably since then.

Although no specifically Australian type of traffic route lighting has yet evolved, it is interesting to speculate on future trends.

Conditions vary from those in Britain in two ways which may well affect future practice, namely, the much longer straight stretches of road, and the amazing clarity of the atmosphere, which accounts for the term "pea souper" being given to what in Britain is known as a "Scotch mist." It may well be that these two factors will bring into being installations with considerably higher mounting heights and longer spacings, which would cut costs while main-

taining substantially the same road brightness without increasing lamp sizes.

Much use is made of solar dial time-switches with contactors for the cascade switching of about four miles of roadway at a time. It is usual to provide dusk to dawn lighting on main traffic routes, while in many suburban areas lamps are extinguished at 1 a.m.

Although, as in other countries, the mileage of inadequately lit roads greatly exceeds the amount of well-designed lighting, Australia can be justly proud of the progress made in street lighting since the war, and a number of typical examples are illustrated.

The longest stretch of first-class highway lighting in Australia is the seven-mile

Fig. 8. 140-watt sodium lamps are used to light the Storey Bridge across the Brisbane river.



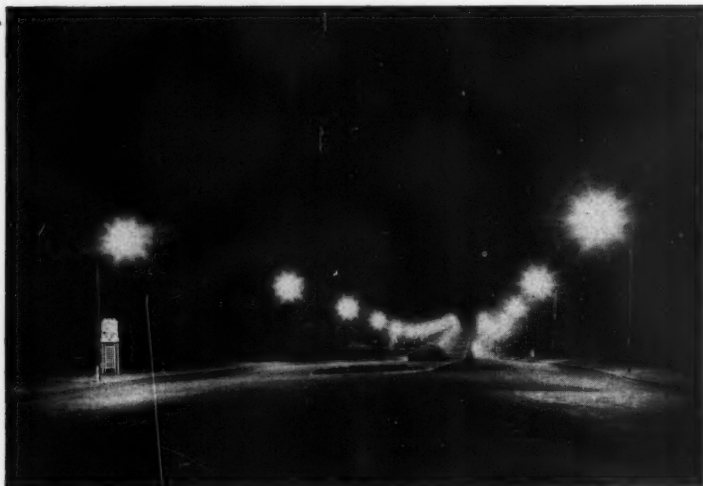


Fig. 9. Horizontal mercury lamps in lanterns mounted on the outer kerbs of Riverside Drive, Perth.

double-carriageway road between Adelaide and Port Adelaide. There are only three bends in the whole length. Visibility is excellent and glare is conspicuous by its absence. One hundred and forty-watt refractor-type sodium lanterns are mounted 26 ft. high, 129 ft. apart, in staggered formation on each 60-ft. wide carriageway, with an overhang of 9ft., as illustrated in Fig. 3. The neat workmanlike Stobie poles, named after their designer (of the Electricity Trust of South Australia), vary in height as some carry not only the street lighting but also high-tension lines, low-tension lines, and trolley-bus suspension wires as shown in Fig. 4. The use made of the wide, flat bases to carry street names in black on a yellow ground, shown in Fig. 5, is commendable.

In Melbourne a number of recent installations have been completed of 400-watt vertical mercury lamps in refractor lanterns mounted at 27 ft. and spaced 150 ft. apart in staggered formation. An interesting test installation on St. Kilda Road is illustrated (Fig. 6), which uses 400-watt horizontal mercury lamps in refractor lanterns, mounted 25 ft. high on brackets projecting from one or both sides of the tramway poles located on the reservations which separate the central carriageway, used by trams and heavy traffic, from the two outer roads which carry fast, light traffic. This arrangement provides a staggered formation at 102 ft. centres for the wide central road-

way and single-sided lighting at the same spacing for the narrower one-way roads on either side.

The well-known Pacific Highway in Sydney, shown in Fig. 7, is lit by 400-watt mercury lamps in refractor fittings in staggered formation 160 ft. apart at a mounting height of 25 ft.

The Storey Bridge across the Brisbane River, together with its approaches, are over a mile in length and are excellently lit by 140-watt sodium lamps in reflector-type lanterns mounted on the bridge structure. A good impression of this lighting is given in Fig. 8.

In Western Australia, Perth's Riverside Drive has double carriageways separated by a reservation. Fig. 9 shows the excellent visibility provided by the horizontal mercury lamps in refractor lanterns mounted in staggered formation on the outer kerbs.

Obituary

We regret to announce the death of Mrs. J. A. Beuttell, wife of Mr. A. W. Beuttell who was president of the I.E.S. in 1935. Many readers will remember Mrs. Beuttell as Miss Moreton who worked on the staff of the I.E.S.

The illustration on p. 372 shows part of the recent installation at Baldock using 140-watt sodium lamps in Crompton "Corona" II lanterns mounted on Concrete Utilities columns.

Fluorescent Street Lighting in France

Fluorescent street lighting is still a controversial matter and experiences in other countries are of considerable interest. The views of the author of the article, who is well known in this country, are of particular interest.

By L. GAYMARD*

In view of the success of the trial installations of fluorescent street lighting in England, the City of Paris decided, in October 1947, to adopt fluorescent lighting for part of the Avenue du President Wilson. This installation, the first of its kind in France, consisted of twelve lanterns on 30 ft. columns on a central reservation, the lanterns overhanging the road by about 10 ft. Each lantern contained five 4-ft. 40-watt lamps with the auxiliary gear housed in the bases of the columns. The carriageway is approximately 27 ft. wide and the lamps were spaced at approximately 100 ft. Trees

on the central reservation happily contribute to prevent the lanterns being too conspicuous. During the four years that this installation has been in operation the results have been excellent, with an even road brightness and very good revealing power.

Following on the success of this trial installation and also as a result of further experience gained in England and in Belgium other installations were erected both in Paris and in a number of towns in the provinces.

Those who know Paris may be interested to learn that fluorescent street lighting is now installed in the following roads: Avenue du President Wilson, Place de l'Alma, Avenue Montaigne, Faubourg Saint-Honoré (part), Rue de Vaugirard (part), Avenue Gambetta, Rue des Pyrénées,

* Street Lighting Engineer, Paris.



Fig. 1. Avenue de la Grande Armée.

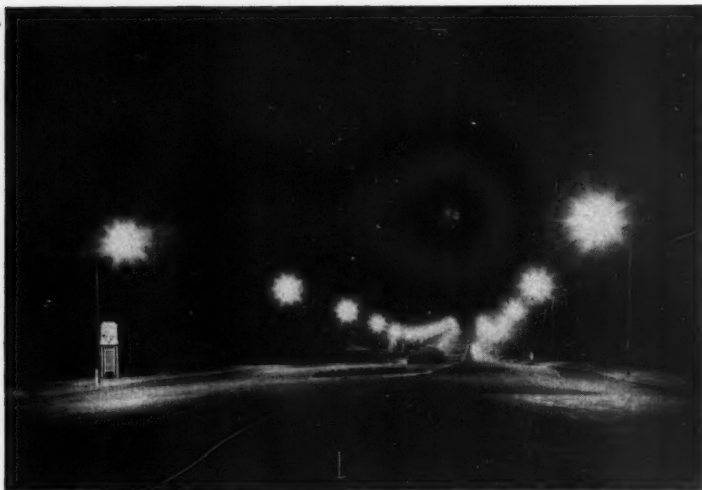


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* Street Lighting Engineer, Paris.



Fig. 1. Avenue de la Grande Armée.



Fig. 2. Avenue du Président Wilson.

Avenue de la Grande Armée, Avenue Victor Hugo, Place Victor Hugo, Boulevard Haussmann, Rue de Messine, Rue Belgrand, Cours de Vincennes, Avenue de St-Mandé, Rue Championnet, Rue Ordener, Avenue des Gobelins, Faubourg St-Antoine, Avenue d'Eylau, Avenue Mozart. In Paris alone over 3,000 florescent lamps are now in use for street lighting.

In the provinces, all the streets in the town of Fécamp now have fluorescent lighting and trial installations exist at Evreux, Caen, Cabourg, Saint-Quentin, Soissons, Rouen, Vernon, La Baule, Mulhouse, Brest, Vichy, etc.

Types of Lanterns

Most of the lanterns used in France are made of an aluminium alloy with reflectors of anodised aluminium, protection of the lamps being provided by plastic covers.

The type of lantern still in operation in the Avenue Wilson, though it gives good results, is no longer made on account of its heavy maintenance cost, due mainly to the excessive number of lamps.

The lanterns now used are as follows:— for residential and side streets, promenades, etc., a lantern using six 2-ft. lamps, which on account of its size and shape, is more aesthetic than the larger lanterns; for ordinary and tree-lined streets, two or three lamp lanterns are used at relatively short spacings of 60 to 80 ft. These provide good

lighting and even brightness on most streets of average width; for main roads, bridges, roundabouts, etc., lanterns using either two or four 5-ft. lamps are used.

It might also be mentioned here that in Paris all the illuminated traffic bollards have now been equipped with 3-ft. 40-watt fluorescent lamps. The bollards are 5 ft. high and it is found that a 3-ft. lamp lights them very effectively with complete absence of glare for drivers or pedestrians. More than 1,200 of these bollards are now in operation in Paris.

Technical Results

Generally speaking, the installations of fluorescent street lighting in Paris have proved very satisfactory with absence of glare and providing both pedestrians and drivers with very comfortable seeing conditions, thus contributing to road safety.

No attempt was made at power-factor correction on early installations, but all new installations conform with the regulation which requires a power-factor of at least 0.9.

Up till about 1951 starters were unreliable and were likely to fail, necessitating costly inspections. The average life of starters now in use is nearly 4,000 hours. Starters are frequently located in the base of the column, and though this entails running additional circuits inside the column and bracket, it does allow easy inspection

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Fig. 3. Avenue
Victor Hugo.



and replacement. Where 4-ft. lamps are used only the starters are accommodated in the base of the column, the other gear being inside the lantern; with the 5-ft. lamps, however, the size and weight of the auxiliary gear makes their location inside the base compulsory. A new system for operating fluorescent lamps without the use of starters is now being tried.

After some initial difficulties solutions are now being found to the problem of easy opening and closing of the lanterns, relamping, cleaning and changing of gear. Some of the new lanterns are designed for relamping through the bottom without need for opening the plastic covers.

An effort is still being made to find a reflector which will be suitable for any height of suspension and for various spacings. In general, lanterns without reflectors are not popular as they give a patchy appearance on the road surface when used at normal spacings, though in spite of this, experiments are still being conducted in an effort to find a satisfactory lantern of this type. Up until a year or two ago most French reflector lanterns had their peak output at above 70 deg. from the vertical. The resulting illumination under the lantern, however, was insufficient and there is now a marked tendency to reduce the peak intensity and the distance between lanterns. Common practice now is a height of 27 ft. with a spacing of 70 to 90 ft., the peak

intensity being at between 55 and 60 deg. from the vertical.

With regard to lamp life, the French manufacturers now give a guarantee of 3,500 hours, and some of them one year, after which time the output is approximately 75 per cent. of the initial value.

Aesthetics

Efforts are still being made to produce better designs of lanterns and columns and guidance has been taken from some of the lanterns used in England. When fluorescent lanterns are used in a tree-lined street the trees themselves help to make the lanterns less obtrusive*—and where there are no trees we hope that people will soon come to accept the shape of the fittings. No doubt, however, our recent approach to the problem of lighting wide roads has led to the use of enormous lanterns frequently installed at an angle to make their silhouette still less attractive.

For example, we have recently installed in the Avenue de la Grande Armée, in Paris, large four-lamp, 5-ft. lanterns with an overhang of 9 ft., 29 ft. high, and inclined at an angle of 45 to 50 deg. Most fortunately huge plane trees line the avenue. The installation begins at the Porte Maillot and

* Our best approach to the lighting of tree-lined roads has been with low-mounted lamps between 18 and 23 ft., e.g., the Avenue Victor Hugo.

ends at a distance from the Arc de Triomphe, laid down by the Fine Arts Commission. The day-time appearance of the new lanterns may be criticised, but the former incandescent lights on this 80-ft. thoroughfare were inadequate and something had to be done. This avenue is the same width as the Champs Elysées, which is still lit by gas, and where, of course, no trials or experiments with new lanterns and columns could be permitted. Since the Paris authorities cannot afford to install on the Champs Elysées a system of lighting which would spoil the appearance and proportions of the vista from the Etoile to the Place de la Concorde and the Tuileries, these trials are being made in the Avenue de la Grande Armée both with a view to the appearance of the lanterns as well as their effectiveness from the lighting point of view. The silhouette of these lanterns and columns is not entirely satisfactory, but we retain them in spite of this as they provide very good visibility and comfortable conditions by night.

Another installation with fluorescent lighting on an 80-ft. thoroughfare is being carried out this summer on the Cours de Vincennes with a new lantern, the shape and performance of which appears to be very satisfactory.

The colour of the lamps used in the Paris installations is being standardised, and we are now taking advantage, when relamping, to change the colour to a warm tone. Our 40-watt warm lamp takes 46 watts, including the auxiliary gear, and has an output of 2,400 lumens after 100 hours' operation. The overall luminous efficiency thus being 52 lm./w.

Since we are punctilious in this matter of colour, we avoid having streets lit by tungsten lamps opening on to streets lit by fluorescent lamps, and we use ML (mixed mercury and tungsten) in the vicinity of fluorescent lamps to make the transition. The only ML lamps available being the 250-watt (5,000 lumens) size, we use two such lamps in a single large globe where necessary.

Finance

In spite of the efforts of manufacturers there is still a considerable difference between the cost of a fluorescent lantern, including lamps, and a tungsten lantern having a comparable light output. The difference is approximately £25 to £30 per column—though strictly speaking the additional cost is more than this because fluorescent lanterns are installed at spacings of approxi-

mately three-quarters that of the tungsten lamp fittings.

As fluorescent installations are maintained on the same inspections as other types of installation and as the average life of the lamps is on the increase, precise figures for maintenance costs cannot be produced. It would appear, however, that the maintenance of fluorescent lanterns is slightly higher than that of tungsten lanterns.

In Paris every dead lamp is replaced



Fig. 4. Cours de Vincennes.

immediately, which, of course, increases the cost of maintenance. The relative cost is more in favour of tungsten as the lamp power increases because the tungsten lamp output is higher for larger lamps and the number of relampings per thousand lamps is lower. But, since the average life of fluorescent lamps is increasing, we expect in the near future to be able to do away with individual relamping in favour of group replacement after, say, 3,000 to 4,000 hours. This will reduce the difference between the costs of maintenance for the two types of installation.

When public authorities change over to fluorescent street lighting the opportunity is naturally taken to improve the level of



Fig. 5. Vertical lanterns at Saint-Jean de Luz.

illumination; the saving in cost of electrical energy is, therefore, less than one might be led to expect. For example, 300-watt tungsten lamps may be replaced by lanterns containing three 4-ft. lamps consuming 165 watts inclusive of gear, or 750-watt tungsten lamps may be replaced by four 5-ft. lamps consuming 460 watts inclusive of gear; but against this saving it must be remembered that the distance between lanterns is generally reduced when conversion to fluorescent lamps is made.

The figures given in the table apply as far as possible to cases dealt with by E. B. Sawyer in his paper to the A.P.L.E. in 1950.* An interesting point is that whilst on the one hand the annual charges for depreciation and maintenance increase on going from low to high power sources and from tungsten to fluorescent lamps, on the other hand the cost of a lumen/year decreases in going from 300-watt tungsten to 500-watt tungsten and then to 3×40 -watt fluorescent and again in going from this to 2×100 -watt fluorescent.

Fluorescent street lighting has not been in use a sufficiently long time to allow us to say with any certainty the period over which the difference of the initial cost can be

(Continued on p. 388)

*Street Lighting as a Public Amenity, by E. B. Sawyer, A.P.L.E., 1950.

Comparison of Running Costs of Tungsten and Fluorescent Street Lighting.

Class A	Incandescent		Fluorescent	
	300 w.	500 w.	3×40 w. ¹	2×100 w. ²
Capital Depreciation :				
Column	2,500 F.	2,500 F.	2,500 F.	2,500 F.
Lantern	300 F.	300 F.	1,500 F.	1,850 F.
Maintenance :				
(inspection, relamping, cleaning)	2,500 F.	3,300 F.	3,300 F.	3,600 F.
Electricity (4,000 hrs. — 8 F. per Kwh.)	9,600 F.	16,000 F.	5,300 F.	7,400 F.
	14,900 F.	22,100 F.	12,600 F.	15,350 F.
Lumen output	4,570	8,670	6,700	8,800
Cost per lumen per year	3.26 F.	2.56 F.	1.90 F.	1.74 F.
Depreciation charges + maintenance + cons. per Km.	447,000	663,000	378,000	460,500
do. per mile	715,000	1,060,000	605,000	736,800

¹ = 165 w. (gear included).

² = 230 w. (gear included).

Street Lighting Columns

By W. E. BALLARD,
B.Sc., F.I.E.S.



Fig. 1

Some practical views on the design and manufacture of concrete lighting columns.

Recently a number of articles have appeared in various journals including *Light and Lighting*, *The Architectural Review*, and even in the popular Press on the subject of street lighting columns. In some there has been a tendency to decry modern reinforced concrete columns or at least those used for Group "A" schemes. When reading some of the sweeping generalisations made in this connection one is reminded of a story of Brooklyn Bridge. It is said that a "traffic cop" approaching the bridge saw someone on the parapet divesting himself and obviously about to take the final plunge into the waters below. Hurriedly parking his machine the policeman made his way to the victim's side and the two were seen in earnest conversation for some time; finally both dived in! Unless one is wary it is easy

to be over-persuaded by some of the articles referred to with their sweeping generalisations, which after all represent one person's viewpoint and do not attempt to deal with practical problems.

Born nearly a quarter of a century ago the concrete lamp standard, now more than ever offers many advantages. The absence of maintenance—one of the original strong features—has now been almost forgotten with the post-war need to conserve steel due to a world-wide shortage.

It must be admitted that some of the earlier concrete columns were exceedingly heavy and came in for well-justified criticism. To meet this some manufacturers have reduced base and shaft dimensions until there is little difference in outline bulk compared with their earlier steel and cast-iron counterparts, bearing in mind also the accommodation in the base required by modern discharge lamp auxiliaries.

One critic (*Light and Lighting*, April, 1952)

complains of the height of the modern columns, but we know that if the toll of human lives on our roads at night is to be reduced then we cannot do less than follow the M.O.T. Final Report of 1937 or the recently issued British Standard Code of Practice (Part 1, 1952). The recommended mounting height for Traffic Routes is laid down as 25 ft. with tolerances of plus 5 ft. and minus $1\frac{1}{2}$ ft. Where the lighting is purely decorative and not related to road safety, mounting height and many other things can be made to fit the surroundings, but how often do such circumstances arise?

From a practical and economic point of view there is everything to be gained by using concrete for lamp standards, but what of the aesthetic angle? Since the Royal Fine Art Commission came into the picture enterprising manufacturers have gone all out to produce designs which are acceptable, and in fact only such designs are considered for trunk road lighting schemes where the M.O.T. make a grant.

Plato wrote that "beauty of style and harmony and grace depend on simplicity," and with few exceptions the designs of concrete lighting columns and brackets which are to be seen on our highways in



Fig. 2



Fig. 3



Fig. 4

ever increasing numbers implement this to a marked degree. Their simplicity is not only in keeping with a tendency to move away from the elaborations of the Victorian era but is directly related to functional design.

It is so easy to criticise designs, or for that matter anything else, for it is said "beauty is in the eye of the beholder," but seldom does a critic make real practical or even sensible suggestions in keeping with modern demands and taking all relevant facts into account.

Specially chosen views for photographs as those shown on page 120 of *Light and Lighting* for April, 1952, convey little, for it is easy to produce many more which give a fairer picture even with so-called "sick-serpents" very much in evidence. There is much contrasting between old and new in Figs. 1, 2 and 3 reproduced here, yet there would appear to be harmony; in the installation shown in Fig. 4 a different bracket is used but the same result is achieved.

So called aesthetically minded people vary enormously in their likes and dislikes, in fact, there is no such thing as a standard aesthetic taste in the design of lamp standards. For the present, industrial designers quite rightly leave judgment on their work to the Royal Fine Art Commission or latterly the Council of Industrial

Design. It is already obvious that there is some lack of agreement even between their outlooks. One might almost suggest there is something to be said for Public Authorities making their own decisions in these matters, and this applies especially where local considerations call for something special. At least one concrete pole manufacturer can offer a range of shafts and brackets to suit varying needs, although naturally the mass-produced article must be cheaper.

In this connection it does seem more than ever necessary for lighting engineers and, in particular, public lighting engineers, to have some basic knowledge of design and the fitness of lighting columns, brackets and lanterns for their surroundings. The Illuminating Engineering Society has for years advocated the inclusion of suitable subjects in the training of illuminating engineers to give an aesthetic background and balanced outlook. This would help to avoid such criticism as can be levelled against those alleged to have "wholly altered the skyline and scale and look of the towns" with their lighting columns and brackets.

One critic states that the Royal Fine Art Commission does not approve of the placing of concrete standards in old towns. One of the alternatives he seems to suggest are short old-fashioned cast iron standards with a height of apparently 10 to 12 ft. or

so. Presumably, therefore, in these towns if road safety is to be preserved, one might also recommend by the same token, that vehicles should only be allowed to proceed on main roads at such a pace that a man with a red flag or lantern can keep a respectable distance in front. You cannot hope to have effective lighting without the requisite height unless a much larger number of lighting points are employed and this is invariably uneconomic. Incidentally this critic seems to have overlooked the fact that for special situations, concrete columns are available exactly the shape and size of his short fluted spigot poles.

Again it is thoughtlessly said, concrete will never weather. Of course, over the years the elements, especially in a smoke or chemical-laden atmosphere, will wear away the surface cement, but there are countless examples of columns which have been installed for wellnigh 20 years, and although rough at the surface are still good for many more years useful service. Even the stone

surfaces of buildings wear away and bricks crumble with the passing of years, in fact, we do not yet seem able to prevent nature from trying to change man-made creations back to their original form. Concrete lighting columns are not normally expected to have a life of more than 25 to 30 years, dependent on local conditions, but in this connection it is worth recording that one manufacturer does, in fact, still give a 25 years' guarantee.

Lighting columns made of steel or cast iron require regular painting and in the intervals usually become faded and soiled. Concrete columns on the other hand require no maintenance and can be produced in a variety of different finishes to please varying tastes.

For certain districts the natural concrete finish presents advantages for long-term maintenance and this can be supplied off-white to dispose of the objection to naked cement colour. There are also columns available with the surface ground to expose

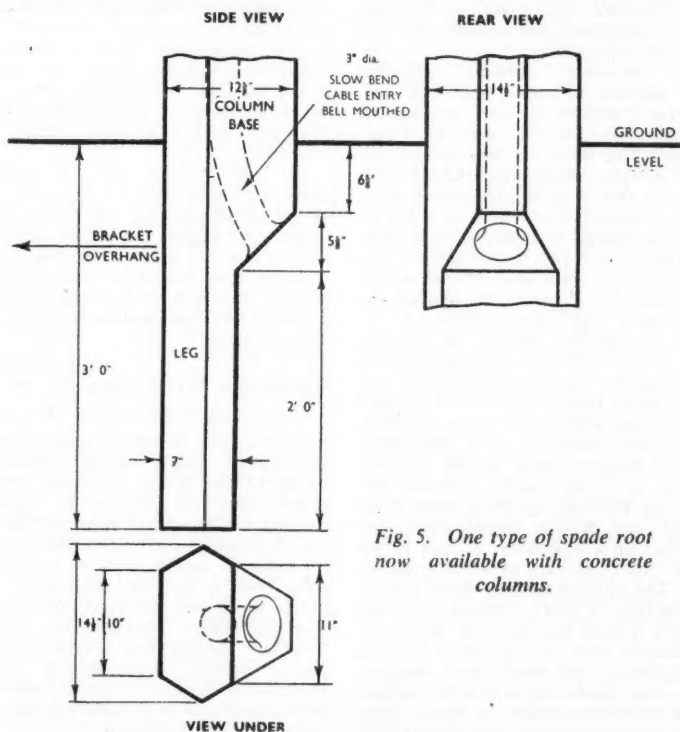


Fig. 5. One type of spade root now available with concrete columns.

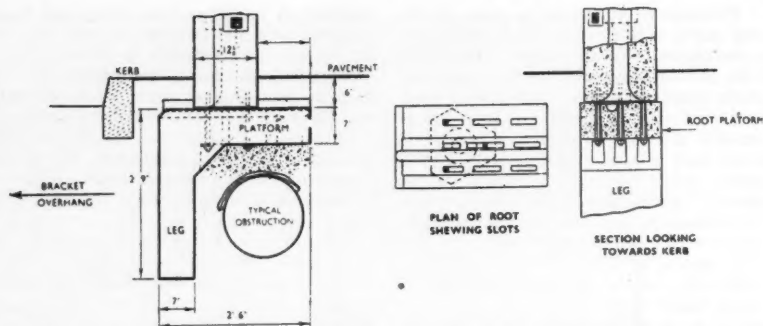


Fig. 6. An adjustable crank root for use when site conditions do not allow spade roots to be used and avoiding the necessity to make special moulds. The position of the column on the platform can be varied; the leg of the platform can be towards the road or towards the pavement.

the aggregate, which may consist of Hilton gravel, granite and others of different colours. Naturally each maker tends to use a standard aggregate and special ones can therefore be expensive.

Many observers consider concrete columns improve in appearance with age, at least for a number of years, acquiring a quiet dignity in keeping with their surroundings. This does not only include the effects of weather, smoke and such, for it is often found that if in a particular locality there is a tendency for lichens or other of Nature's adornments to colour parts of walls and buildings they often do the same to the lighting columns. This may or may not be an advantage but it assists in making the columns blend with their background.

Before leaving the subject of concrete lighting poles a recent development may prove of interest. In an article in *Light and Lighting*, dated December, 1949, I referred to special roots which could be produced to enable concrete standards to be installed in a footpath beneath which existed obstructions such as pipes, cables, culverts, etc. Considerable headway has been made since then and one British manufacturer has standardised on a new form of root called a "spade" root, one type of which is shown in Fig. 5. The width of the root varies, according to the type of shaft, between 6 in. and 7 in., which is even less than the dimension of the normal type of steel street lighting column formerly used which had a diameter of 8½ in. This spade root is now the normal root and although smaller in bulk, being solid is even stronger than the original type

which continued the plinth to below ground level and was hollow. To enable columns to be erected immediately over obstructions and to give a reasonable degree of latitude in positioning them, there is also a newly developed adjustable crank root as shown in Fig. 6. This is reversible and is secured by bolts formed by extensions of the main reinforcing rods which pass through slots as indicated.

The writer hopes that this article will prove a suitable reply to the critics as well as giving information on recent developments. As regards the outline and appearance of concrete lighting columns in general if those who find them unacceptable will produce improved but practical designs there is little doubt that manufacturers will gladly consider them.

Fluorescent Street Lighting in France

(continued from p. 383)

balanced, but it would appear from the approximate results already obtained that, owing to the saving in energy, the extra initial cost of fluorescent lighting is recovered in about five years for main roads and in about 10 years for smaller ones.

Finally, I would mention a cheap one-lamp lantern for the lighting of narrow streets which has just been introduced, and a vertical lantern containing two 5-ft. tubes. This last lantern was designed to satisfy certain aesthetic requirements and has proved very popular in many French towns and resorts and it is expected that it will soon be in great demand.

The Concept of Luminance in Street Lighting

Brightness engineering, a subject now being studied in all fields of illuminating engineering, was first applied, nearly 20 years ago, in connection with street lighting. The following article offers some reasons why this approach to street lighting problems has not been adopted in practice and suggests methods which may lead to this.

by J. B. de BOER*

hoping in this way to make luminance as familiar to the public lighting engineer as illumination (1).

A Luminance Meter

It is quite understandable why up to now no instrument has been made available—at least to the author's knowledge—which is at the same time specially suited for measurements in lighted streets and sufficiently handy. There are two reasons for this: luminance should be measured (a) at a very small spot, and (b) in a very well-defined direction. This can be understood from the following consideration. In fast traffic the stretch of road between 200 and 600 feet in front of the car driver forms the most important part of his visual field. An obstacle half a foot high and 200 feet in front of the observer covers approximately 22 feet on the road. If the obstacle is 600 feet in front of the observer it would cover 66 feet. It is the average luminance of stretches of the road of this size which is of importance for visibility. A street-lighting luminance meter, therefore, should enable the measurement of average luminance values in fractions of the perspective image of the road surface not greater and preferably smaller than the images of the above-mentioned stretches. A stretch of the road 600 feet ahead of the observer with a length of 66 feet subtends a verticle angle on the observer's eye equal to three minutes of arc. From this it can be seen that the vertical dimension of the image of the spot on the road involved in the measurement should be kept very small. In

(1) For a detailed study of the subject reference is made to the paper: "Practical methods for measuring and calculating the luminance of road surfaces," by J. B. de Boer, V. Oñate and A. Oostrijck, Philips Research Reports 7, 54, 1952.

Introduction

The importance of the luminance of the road surface and its distribution for the quality of a public lighting installation is far greater than that of the illumination. It might even be stated that the lighting quality is almost exclusively determined by the luminance of the road surface provided the glare of the lighting fixtures is kept within comfortable limits.

Notwithstanding these facts being more or less generally accepted, the luminance of the road surface is still a concept not likely to be used quantitatively by the public lighting engineer who mainly has to deal with street lighting from a practical side. However, the evaluation of street lighting would correspond better to what can actually be seen on the road if luminance could be introduced into everyday practice. To this end two things are necessary, viz.: a convenient measuring device and a practical method of predetermining the road luminance.

Of recent years we have developed a luminance meter and a method for computing the road luminance, both of which seem to be acceptable in practice. In what follows is given a short description of the measuring as well as the calculating method,

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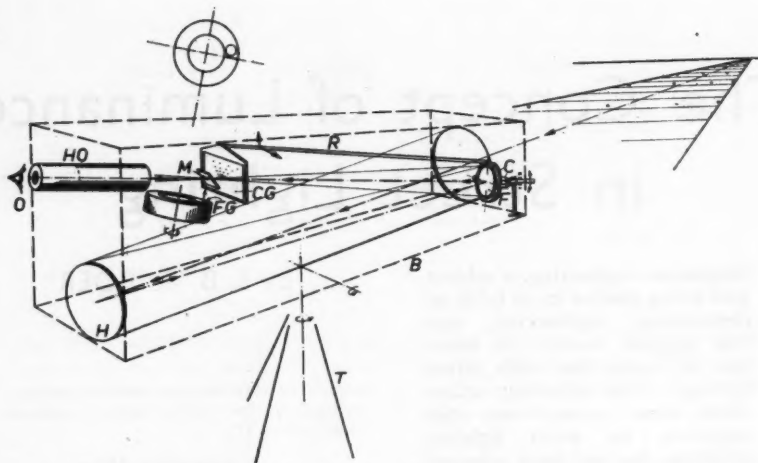


Fig. 1.—Diagrammatic representation of a luminance meter with an extremely small mirror as field of comparison; *M* = small comparison mirror, *H* = convex mirror with focal plane in *M* (via *F*), *F* = plane mirror, *CG* = transparent glass with adjusting pattern, *R* = rod connecting *CG* rigidly to *F*, *C* = cardan joints allowing rotation of *CG* and *F* around the centre of *F*, *HO* = Huygens ocular, *O* = observer's eye, *FG* = frosted glass with decreasing luminance, *B* = case, *T* = tripod.

view of this we decided to build a luminance meter in such a way that the luminance is measured in a spot subtending 1.5 minutes of arc.

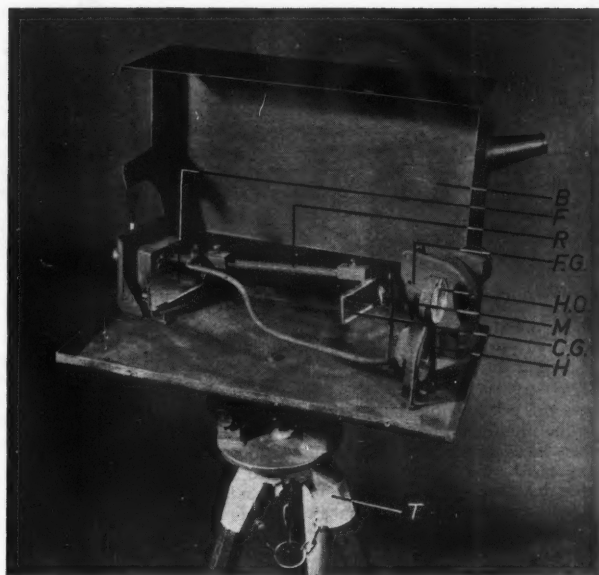
Furthermore, a very accurate adjustment of the measuring direction is required. This is clear when taking into consideration that a point of the road 600 feet ahead of the observer is seen under an angle of approximately half a degree with the horizon, while a variation of one minute of arc in this angle results in a shift of 26 feet in the stretch of the road observed.

We have found a practical solution for the first difficulty (the limited size of the spot involved in the measurements) by applying telescopic visual photometry. Fig. 1 illustrates the principle of a recently constructed luminance meter of this type. A photograph of this meter is shown in Fig. 2. The convex mirror *H* (focal length 0.50 m.) and the plane mirror *F* produce an image of the road in a vertical plane through *M*. *M* is a small mirror of 0.3 mm. diameter made by evaporating aluminium upon a piece of transparent glass. This piece of glass is placed at an angle of 45 deg. with the direction of observation. Looking in the small mirror *M* one sees a frosted glass *FG* which

covers a ring-shaped box with a small incandescent lamp inside. By turning the ring-shaped box the luminance seen in the small mirror *M* can be varied. In this way the luminance of the mirror *M* can be balanced with the luminance of the stretch of the road seen adjacent to the mirror. In a vertical direction the mirror *M* has to cover a stretch of the road subtending an angle of 1.5 minutes of arc when seen by the unaided eye. The sensitivity of the human eye for the difference in luminance of a spot of 1.5 minutes of arc and that of its surroundings would be too small for adequate accuracy of the luminance balance, especially at the low luminance values prevailing in street lighting. By means of the chosen optical system we obtain an angular magnification of 12 times, which ensures a satisfying accuracy (approx. 15 per cent. at 0.03 foot-lambert).

We now come to the second difficulty, viz. the necessity of an accurate adjustment of the direction of viewing. Moreover, this direction of viewing must frequently be changed as a great many points should be measured for the determination of the luminance distribution. The adjustment facilities therefore should not only be reliable but they

Fig. 2. Photograph of the luminance meter shown in Fig. 1. (For the meaning of the letters see Fig. 1.)



should also allow a quick change-over from one direction to another. This has been solved in the following way. The mirror F can be turned in the cardan joints C by means of adjusting screws in two directions at right angles with each other. Thus the image of any desired point on the road can be focused on M. The transparent glass CG, approximately in the focal plane of H, is rigidly connected to mirror F by means of the rod R. Thus the positions of F corresponding to certain points on the road can be marked by points on CG covered by M in those positions. So a pattern of points can be made on CG corresponding to a pattern of regularly distributed points on the road.

The instrument has to be adjusted so that the pattern on CG corresponds to the pattern on the road actually chosen for the measuring points. This is taken care of in the following way. The height of the mirror H above the road surface is adjusted at 5 feet. The mirror F is turned in such a way that, seen through the ocular HO, the vanishing point of the pattern on CG coincides with M. Two lamps are placed on the road at a distance of, say, 200 feet and at the height of H. One is placed right in front of the observer and thus will be seen coinciding

with the vanishing point of the horizontal road under consideration and the other at some lateral distance (say 20 feet) from it. The mirror F and the box B now must be adjusted relative to the tripod T in such a way that the first lamp (seen through HO) is covered by M and simultaneously by the spot on CG corresponding with the vanishing point, while the second lamp is seen on a horizontal line on CG through this point.

The actual pattern on CG shows 60 points regularly distributed over a stretch of the road between 100 and 700 feet ahead of the observer. Of course, intermediate points which are for some reason of special interest can be measured in between. Also in curves or on hilly roads a distribution of the measuring points different from the regular one already indicated on CG will be used.

The luminance of the frosted glass FG varies from 7 to 100 foot-lamberts. By means of neutral filters the luminance range can be extended from 0.007 to 100,000 foot-lamberts. The complete measurement of the distribution of the luminance in the above-mentioned pattern of points takes about one hour for somebody without photometric experience. The overall size of the meter is 4 in. x 6 in. x 16 in.

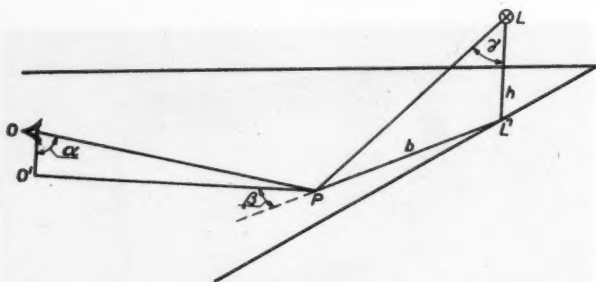


Fig. 3. Geometrical figure with angles α , β and γ determining the luminance coefficient q ; L = light source; O = observer's eye; P = point under observation.

A Method For Predetermining Luminance

If, in Fig 3, I is the luminous intensity of the light source L towards the point P on the road surface, the illumination at P is $(I/h^2) \cos^3 \gamma$. An observer O looking to P sees this point with a luminance proportional to the illumination at P . If the ratio between the luminance and the illumination is expressed by a factor q , the luminance at P seen by the observer O is $q (I/h^2) \cos^3 \gamma$. The direction of observation and the direction of light incidence are determined by the angles α , β and γ .

As q depends on α , β and γ theoretically only some three-dimensional representation can give a complete picture of the factor q , which actually represents the reflecting properties of the road surface. Furthermore, such a representation should be combined with some procedure for computing the

illumination in the different points of the road surface due to each single lantern. From all this it will be clear that a complete and exact calculation of the distribution of the luminance of the road surface is too complicated for everyday practice. Therefore, we have looked for a simplification which is allowable from a viewpoint of accuracy.

Figs. 4 and 5 show the simplification introduced in order to simplify the problem. The plane of drawing in Fig. 4 represents the road surface. The observer is above O' , and is looking towards point P . Suppose we move a lantern with a luminous intensity in all directions of one candela at a fixed height h over the road surface in such a way that the luminance at point P does not change. For every value of the luminance we will find a definite trace of the lantern. Now the curves in Fig. 4

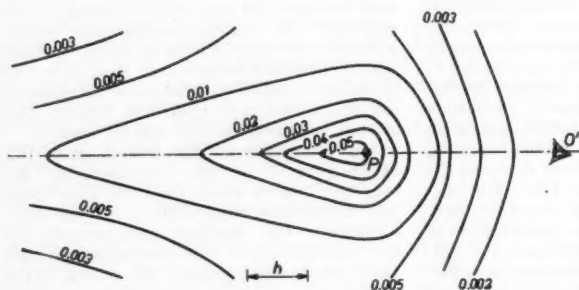


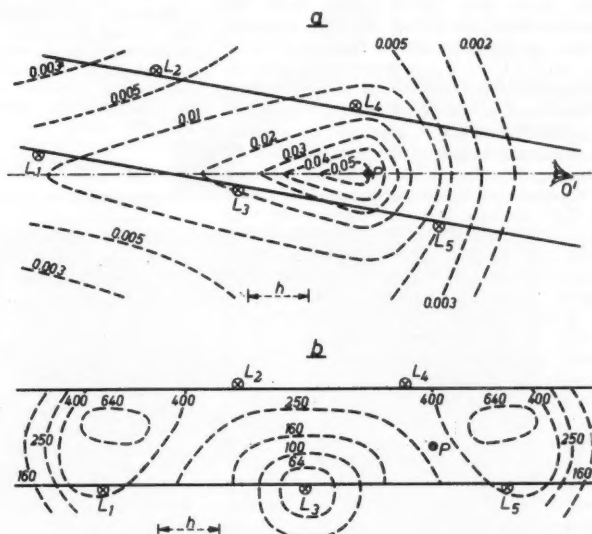
Fig. 4. Representation of the reflection properties of a road surface by means of an E.P. diagram. The observer is over point O' and looking at point P on the road surface. The curves represent projections of lamp positions for which the product $q \cos^3 \gamma$ for point P as seen by the observer has the value indicated at each curve. The diagram can be used for distances $O'P$ greater than $40 \times$ the height of the observer's eye above the road surface.

represent the projection of a few of these traces on the road surface. In order to make the diagram valid for all values of the height h of the fixture it has been drawn on a scale with h as a unit of length, while the values indicated at the curves, representing $q \cos^3 \gamma$, should be divided by h^2 in order to find the luminance. The diagram of Fig. 4 will be referred to as the "E.P. diagram," "E.P." standing for "equivalent positions," i.e., lamp positions equivalent in

the simpler two-dimensional representation applicable.

What is the significance of the restriction dictated by the minimum distance O'P? If road lighting is only considered from the viewpoint of traffic safety the function of the lighted road surface is mainly that of a background against which a driver must be able to discern obstacles. He must already have noticed, and quite accurately observed, these obstacles at distances of at least 300 ft.,

Fig. 5. Explaining the use of the E.P. diagram.



producing $q \cos^3 \gamma$ at P. This diagram should be used in combination with some procedure allowing in a simple way for the determination of the luminous intensity of the lanterns towards the points of the road surface. This is shown by means of the example below.

Strictly speaking, for every distance O'P another E.P. diagram should be available. However, errors of only a few per cent. are introduced if one and the same diagram is applied for all distances O'P greater than 40 times the height of the observer's eye above the road surface. This means in fact that variations in the viewing angle α corresponding to an increase of O'P from 200 ft. to infinity (a varying from about 88 deg. to 90 deg.) do not affect the factor q within the required accuracy. By the neglect of the influence of α on q the necessity of some three-dimensional representation of this factor is avoided, making

which means that the part of the road surface against which the more important obstacles stand out lies still farther ahead. So a procedure enabling the calculation of the distribution of the luminance of the road surface as seen from distances of 200 ft. and

Table 1

Lamp	$q \cos^3 \gamma$ at P	$I \rightarrow P$	$h^2 \cdot \Delta B$
L ₁	0.008	40 cd	0.3 cd
L ₂	0.0045	640 "	2.9 "
L ₃	0.020	325 "	6.5 "
L ₄	0.015	205 "	3.1 "
L ₅	0.005	190 "	1.0 "
$\Sigma h^2 \cdot \Delta B = 13.8 \text{ cd}$			
$h = 25 \text{ ft. } B = 0.022 \text{ cd/ft.}^2 = 0.069 \text{ foot-lambert}$			

greater gives complete information on the lighting problem considered from a viewpoint of traffic safety. If accurate information on the luminance at shorter distances is wanted a few additional E.P. diagrams for the nearer parts of the road surface are required. The calculating procedure itself, however, is in no sense altered by such a supplement.

Fig. 5 illustrates how luminance values are calculated for selected points of a pavement more than 200 ft. away from the observer with the aid of an E.P. diagram. A plan of the road with a lighting installation (lamps L_1 to L_n) is drawn on a sheet of transparent paper, expressing the dimensions of the road in the same unit of length h as indicated in the E.P. diagram (h represents the mounting height of the fixtures). Let P_1 in the plan be one of the points on the road to be observed by the observer O . Cover the E.P. diagram with the transparent road plan in such a way that P_1 coincides with P in the E.P. diagram and the direction $P.O.$ with the axis of symmetry of the E.P. diagram. Fig. 5a shows the situation. For the lamp positions L_1 to L_n the values of $q \cos^3 \gamma$ are then read and compiled in Table 1 (second column). Then the luminous intensity in the direction of P_1 has to be determined for each lamp. The simplest way to do this is to apply an iso-candela diagram plotted in a plan of the road and showing for one lamp, by means of iso-candela lines, all points on the road surface towards which the lamp radiates certain luminous intensities. Cover this iso-candela diagram with the transparent road plan in such a way that L_1 to L_n of the plan coincide successively with L (the place of the lantern) of the iso-candela diagram, making sure that in the case of a non-axial-symmetrical light distribution the iso-candela diagram is in the correct position in respect of the road. In this way the values of the luminous intensity in the direction of P_1 can be obtained for each lamp.

For lamp L_1 the procedure is shown in Fig. 5b. The third column of Table 1 gives the various I values. It remains to multiply the numbers in column two by those in column three for each row. The results entered in column four contain the contributions of each lamp to the luminance of the observed point P_1 multiplied by h^2 . Adding the values in column four and dividing the sum by h^2 gives the total luminance of the pavement at P_1 as seen by the observer O .

The same operation has to be applied to each point P_2, P_3 , etc. Once this has been

done for a sufficiently large number of points, iso-luminance lines can be drawn for one particular observer O on a road with a number of fixtures L_1, \dots, L_n .

According to our experience, the above methods for measuring and predetermining road luminance will be valuable assets in endeavouring to spread the use of the concept of luminance in road lighting practice.

SITUATIONS WANTED

Register LIGHTING ENGINEER, aged 26, C. and G. Final "A" and "B," seeks employment in London. Box No. 839.

A.M.I.E.E., with over 30 years' engineering experience, desires position in electrical or illuminating engineering in Scotland. Box No. 840.

SITUATIONS VACANT

LIGHTING ENGINEER, to open up new ground for Electrical Contractors in Lancashire. Details of experience and salary required. Box No. 838.

ILLUMINATING ENGINEER required for the design of automobile lamps. Duties include the design of optical systems for illumination control. Experience in similar work is an advantage, but consideration will be given to a graduate with suitable optical training and an interest in illuminating engineering. The position provides good scope for personal initiative and excellent prospects for advancement. Write, stating qualifications, experience and age, quoting reference PM/D/28 to Personnel Manager, Joseph Lucas, Ltd., Great King Street, Birmingham, 19.

City of Birmingham Public Works Dept.

Applications are invited for the post of ENGINEER—Street Lighting Section.

Candidates must be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications and should have experience in all matters concerning street lighting.

Salary within Grade A.P.T. VI (£670/735 per annum) according to qualifications and experience.

The post is permanent, superannuable and subject to a medical examination.

Applications, endorsed "Engineer—Street Lighting Section," stating age, qualifications, experience and the names of two persons to whom reference can be made, should reach the undersigned not later than November 8, 1952.

HERBERT J. MANZONI,
City Engineer and Surveyor
Civic Centre, Birmingham, 1.



I can **LIGHTEN** the driver's job!

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No. 161

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MUCH EASIER MAINTENANCE OF FLUORESCENT LIGHTING

***Replacement of lamps all that is needed
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The overall luminous efficiency is about 22 lumens/watt initial ("Natural" or "Daylight" fluorescent) or double that of ordinary tungsten lamps. The substantial total light output reduces the number of lighting fittings required.

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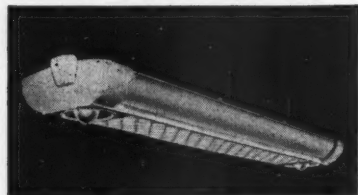
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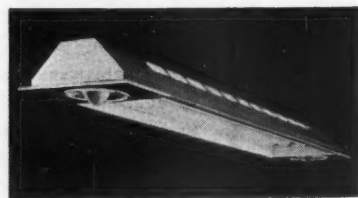
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A.P.L.E. Conference at Harrogate

Report on the proceedings and outdoor display in connection with the recent annual conference of the Association of Public Lighting Engineers.

The annual conference of the Association of Public Lighting Engineers was held at Harrogate from September 16-19 and was attended by nearly 1,200 delegates from all parts of the country and including several visitors from overseas. This year the exhibition of equipment was held in a large tent adjacent to the Royal Hall where the meetings took place; the advantages of this were obvious, and as a result the exhibition was one of the best ever staged by the Association.

The proceedings opened with the annual general meeting on the morning of Tuesday, September 16, with the retiring president, Mr. H. Pryce-Jones, in the chair. It was announced that the following had been elected to office for the ensuing session:—

President: Mr. E. Howard, F.I.E.S. (Public Lighting Engineer of Nottingham).

Vice-President: Mr. C. C. Smith, A.M.I.E.E. (Liverpool).

Members of Council: Mr. H. F. Cork (Manchester), Mr. F. C. Smith (North Thames Gas Board), Mr. N. Axford (South-Western Elec. Bd., Plymouth), and Mr. J. M. Ward (Glasgow).

The new president, Mr. Howard, was then installed, after which the conference was welcomed to Harrogate by the Mayor.

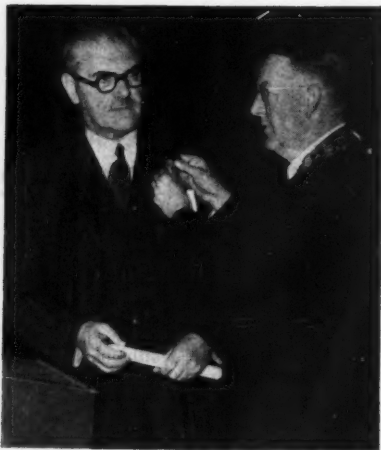
Presidential Address

The first business meeting of the conference took place on Tuesday afternoon, September 16, when, at 2.30 p.m., members and delegates assembled in the Royal Hall to hear Mr. E. Howard, F.I.E.S., the City

Lighting Engineer of Nottingham, deliver his presidential address. He first referred to the Association's scheme for the award of a diploma in public lighting (see *Light and Lighting* for March, 1952). The educational requirements and experience deemed necessary had, he said, been adapted to meet the needs of members with varying training and background. Of the present membership about one-sixth were professional public lighting engineers, a quarter were men who, while having the administrative control of public lighting, were primarily civil engineers, rather less than one-half were primarily electrical or gas engineers whose duties included control of public lighting, while the remainder were engaged in research, or the design, manufacture or selling of equipment.

The second development to which Mr. Howard referred was the organisation of provincial sections of the Association, following the success of the Scottish and the combined Lancashire and Yorkshire sections. Such sections were now in course of formation in other areas, and it was felt that they would benefit especially those members who, for various reasons, could not attend the annual conferences.

The president then turned to his main theme, viz., the influence of public lighting on road safety. He said that in this country statistics were not available to show a definite relation between the accident rate and the conditions as regards street lighting, but in the printed version of his address there was an extensive table showing, for each month of the year 1951, the number of accidents in three categories (a) fatal, (b) causing serious injury and (c) causing slight injury, which had occurred by day and by night respectively. He described an interesting test made on one of the traffic routes in Nottingham, where the lighting had been



The new President, Mr. E. Howard (right), and the retiring president, Mr. H. Pryce-Jones.

improved to the standard recommended in the recently published Code of Practice for Traffic Routes. It was arranged to take a headlight survey under the worst conditions on a night when it was raining. The time chosen was between 11 p.m. and midnight, when it was usually found that a large number of drivers continued with their headlights fully lighted. Observations were made at a position approximately a quarter of a mile inside a stretch of road on which the improved lighting scheme had recently been installed. An examination of the results showed that only 6 per cent. of the vehicles passing the observer had headlights fully on, 9 per cent. had dipped headlights, and the remaining 85 per cent. used sidelights only. It was also noted that on entering the improved lighting scheme the majority of drivers using their headlights switched them off, and the reverse action was taken when leaving the newly lighted section.

Mr. Howard then mentioned studies of accident statistics carried out in Canada and in the U.S.A. (The latter were dealt with in more detail by Dr. Dickerson, in his paper.) He suggested that similar investigations should be made in this country, preferably in one of the smaller towns with a bad road accident record. After some remarks on costs, including a reference to the fact that the total cost per head of the street lighting in this country was 1.04d. per week,

"roughly the cost of half a cigarette," Mr. Howard said that the individual citizen, whilst slow to show appreciation of the widespread benefits derived from street lighting, was remarkably prompt to notify the lighting authority where there was poor lighting or no lighting at all. The public should be made more aware of the difficulties confronting the public lighting engineer, and he thought that it would be valuable if a section devoted to the art and practice of street lighting could be placed in the Science Museum at South Kensington.

Methods of Controlling Street Lighting

Immediately after the president had concluded his address, Mr. N. Axford, district manager of the South Western Electricity Board, read an interesting paper on methods of control, comparing the different systems now in use, not only as regards their convenience and flexibility, but also as regards their cost to an urban authority. He began with a half sentimental and wholly deprecatory reference to the lamp-lighter who, he said, still lingered in some areas although the cost of this system was much higher than that of any of the others. By far the most commonly used method of control was the time switch, which could take various forms, the simplest being that in which the supply, whether gas or electricity, was turned on or off at a pre-set time by a clock-operated switch or cock, the clock being wound by hand, usually once a fortnight. The cost was about £2 5s. per lamp per annum. If the clockwork was replaced by an electric clock with a "solar dial," a device which automatically adjusted the times of switching on and off in accordance with the lengthening or shortening days, the cost was reduced to 10s. 2d. The chief drawback was the disorganising effect of power cuts. An alternative was to use an electrically wound time switch in which there was a spring reserve of motive power so that interruption of the supply did not affect the timekeeping. This was more expensive, costing about 18s. 6d. per lamp per annum.

The author then described the use of a distribution cable with a fifth core which was reserved exclusively for the street lighting. An extension of this was the "cascade method," in which a group of lamps, controlled by a time switch, were in a circuit which included a relay controlling a second group of lamps. These lamps, in their turn, were in series with a second relay controlling a third group of lamps, and so on. This

system, said Mr. Axford, was not very popular.

An altogether different form of control was the photo-cell operated relay, which turned the lights on or off not according to the time of day but according to the prevailing daylight illumination. Theoretically this system was ideal, but in practice it had certain disadvantages.

The final system described by the author was centralised control by superimposed currents, either d.c. or, more usually, a.c., and often termed "ripple control." Since the controlling current was injected into the network, such a system had necessarily to be under the jurisdiction of the supply authority. The frequency range used was normally between 300 and 800 cycles per sec. Such systems were coming into use only slowly, partly because of the high initial capital outlay required. However, Mr. Axford said he was hopeful that in due course area boards would be able to offer such a system to all lighting authorities in their area, because they could themselves make use of it for purposes other than the control of street lighting.

Mr. Axford concluded his paper with a summary of the advantages and disadvantages of each system, including its cost estimated on the basis of certain necessary assumptions.

Mr. Granville Berry, of Coventry, in opening the discussion, made some comments on the costs given by the author and expressed the hope that a method of radio control of street lamps would be developed. This would not only be cheap, but it would avoid any interference with the network and



Mr. E. B. Sawyer with Mr. A. Kelso.

therefore could remain under the direct control of the lighting department.

Mr. A. E. Morgan, of the London Electricity Board, and Mr. J. H. Morrison, of Bolton, both criticised the author's cost figures, the former saying that many of these were too low, while the latter claimed that the cost of winding had been put much too high.

Mr. F. W. Widnall, of the B.T.H. Company, said that series operation was not at present used in this country but he felt that it might well be adopted for the lighting of trunk roads.

Mr. E. J. Cook, of the North Western Electricity Board, put in a good word for electrically wound clocks, which he had found very reliable, and said that on housing estates he had found the most economical plan was to lay an extra cable exclusively for street lighting.

Mr. L. A. Doxey, Public Lighting Engineer of Leeds, referred to the large area in that city which was being converted to ripple control. He said that several speakers seemed to think that because the system had to be operated by the area board, the lighting department would cease to have any say in the matter. This was certainly not the case; the lighting department fixed the times of switching on and off and the supply authority acted on their instructions.

Experiences with photocell control were recounted by Mr. L. R. Osgood, of Luton, where two such systems had been used and found very satisfactory—although when the harvest moon was at its height, the street lighting sometimes did not come on.

The author, in his reply, confined himself to dealing with a few of the more technical matters. Since many of the points raised were on matters of cost, he thought it would



Dr. H. F. Gillbe, of the Ministry of Transport, with Monsieur André Beereboom, of the Ministry of Public Works, Belgium.

be better to reply more fully when the paper appeared in *Public Lighting*.

The vote of thanks, proposed by Mr. N. Boydell, was carried with acclamation.

Illuminations and Outdoor Decorative Lighting

The paper at the first conference session on Wednesday morning was by Mr. H. Carpenter, the Illuminations and Public Street Lighting Officer of Blackpool. It might well have been expected that his paper would be concerned solely with the type of display and effect lighting with which Blackpool is now universally associated in the public mind, but in fact Mr. Carpenter began with a reference to the more ambitious schemes of exhibition lighting, such as those seen at the Paris Colonial Exhibition in 1931 or the Brussels Exhibition of 1935. He then turned to the use of lighting displays as a means of extending the season at a holiday resort. Such a scheme, he said, if backed whole-heartedly by all the business interests in a town, could attract a large number of visitors. Later on in his paper he estimated that the cost of even the very large and expensive installation at Blackpool would be covered if every visitor contributed not more than sixpence.

Mr. Carpenter then went on to describe the exacting demands made on the equipment and the need for special construction capable of withstanding all weather conditions, including high winds. Salt deposit from sea spray, too, could be very troublesome electrically, while blown sand and grit created special problems, one of them the rapid deterioration of externally sprayed lamps. He did not favour the use of low-voltage lamps in series, but he said that low-watt ratings were very useful, since it was the number of lamps used, rather than their intensity, that was important. Special features and tableaux were generally made up with plywood or plasterboard on framing; papier mâché figures were useful and a particularly attractive novelty was the figure made of coloured sprayed plastic woven on a shaped iron framework, rather after the fashion of a cocoon. This had the additional advantage of a good daytime appearance, a matter of considerable importance in a display which was to last for some time.

Parks and gardens, according to the author, were especially suitable subjects for lighting treatment and were the least expensive. Colour could often be used with advantage, while water, if suitably and tastefully illuminated, could be most effective; fountains and waterfalls provided wonderful

opportunities for colour sequences. The floodlighting of buildings was a feature of every decorative lighting scheme but this could, with advantage, be varied by the occasional use of outline lighting. Special structures required individual treatment and Mr. Carpenter mentioned the Tower at Blackpool, on which over 10,000 lamps were used.

The next part of the paper dealt with the important subjects of planning, tariffs and costs. "Decorative lighting," said the author, "is as much an art as a science; and it is desirable to have the services of a lighting engineer conversant with this type of work, who combines experience and skill with artistic interpretation." Wherever possible the layout should be arranged so that it could be readily changed to introduce an element of novelty. Much cost could be saved by planning for easy maintenance.

Finally, Mr. Carpenter gave some details of the equipment used at Blackpool and the costs involved. The number of lamps was 325,000 while the total area of the 40 large tableaux was 10,000 sq. yds. There were 40 miles of festoon strip and 60 miles of temporary wiring, while over 1,000 gallons of paint were used annually. The total value of the equipment was estimated at over a quarter of a million pounds. Some details were also given of the installations at other holiday resorts and Mr. Carpenter concluded his paper by expressing the opinion that decorative lighting would increase in popularity in the future and he urged that architects' designs for public buildings, pavilions and the like should always make provision for this amenity. He then showed a large number of slides, both monochrome and colour, to illustrate his remarks and, finally, the screen was drawn up and revealed on the stage of the Royal Hall a most striking display of items actually used at Blackpool, including a tableau of Robin Hood carrying off Maid Marian (a graceful reference to the president's connection with Nottingham) and some very attractive groups of spun plastic flowers.

The discussion was opened by Mr. T. Brian Hill, of Southend-on-Sea, who, after disclaiming any responsibility for designing the illuminations for which his town had now become famous, asked the author a number of questions about the types of electrical equipment used and the labour force involved. The audience appreciated his remark that at Southend they were not worried with sand.

Dr. H. H. Ballin, of Thorn Electrical Industries, thought that some delegates

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might be scared by the magnificence and the cost of the Blackpool illuminations. This would be very unfortunate because any town with a park or gardens could make a most effective display at comparatively small cost and it was to be hoped that the coming year of the Coronation would see many such schemes in operation. If an authority had only limited funds at its disposal it would be well advised to concentrate its efforts and not to disperse the lighting thinly over a large area. He mentioned the beautiful effects obtainable by the use of fluorescent powders. Trees, he said, should generally be illuminated from below with green light, though some yellow from sources concealed within the foliage made a very effective display.

Councillor Eastwood, of Manchester, said that his city was to spend £8,000 on flood-lighting for the Coronation. He hoped every local authority would make Coronation week a lighting week and use it to bring the advantages of good public lighting home to the average citizen.

In his reply, Mr. Carpenter referred to some of the points raised, particularly by Mr. Brian Hill. He said that during the period of the illuminations he had 14 electricians and 14 mates continuously employed, while at peak periods, as during erection, his labour force was between 100 and 150. He did not give much encouragement to a suggestion that towns might exchange equipment from time to time so as to be able to provide greater variety in their displays.

Mr. F. A. Doxey proposed a vote of thanks to the author and this was endorsed enthusiastically by all those present, including a number of ladies who attended on this occasion.

Street Lighting in the U.S.A.

The Wednesday afternoon session was the occasion for the presentation of a paper by a welcome visitor from overseas, Dr. A. F. Dickerson, general manager of the Lighting and Rectifier Department of the G.E.C. of America. Considerably more than half the paper—which was entitled "Street Lighting—U.S.A."—was devoted to showing how it had been proved conclusively in America that good street lighting increased road safety and reduced the night accident rate. It had been estimated that road accidents in the United States in 1951 had cost the country about £1,250,000, quite apart from the loss of 37,500 lives. Valuable evidence of the reduction of accidents by street lighting had been obtained during the war-time

"dim-out" and numerous towns had reported spectacular reductions in the accident rate after conversion of the street-lighting system to modern standards. Dr. Dickerson gave some interesting details of a conversion programme now in progress in Kansas City, where the total lumens were being increased from 11.5 to 49 millions although the yearly cost would be raised only slightly because the cost per 1,000 lm. would be reduced in the ratio of 1 to 3.7. Dr. Dickerson mentioned, too, that, in addition to improved road safety, good street lighting was a valuable deterrent of petty crime.

The second part of the paper was a brief outline of current street lighting practice in the U.S.A. This, said the author, was generally based on the code prepared by a committee of the American Illuminating Engineering Society and issued by the American Standards Association as the "American Standard Practice for Street and Highway Lighting." (A revised draft of this code recently appeared in *Illuminating Engineering* for August, 1952.) The five types of light distribution recommended in the code were shown by Dr. Dickerson, who said that all manufacturers of street lighting equipment supplied fittings which conformed with these recommendations. He estimated that there were over a million street lighting fittings in the United States using filament lamps, 90 per cent. of them operating on constant-current high-voltage circuits. The number of mercury lamps was probably more than 60,000 and this was increasing rapidly. He added that the 20,000 lm. colour corrected mercury lamp would probably be used extensively on business streets. Sodium lamps were generally used only for special locations, such as subways or inter-sections.

On the use of fluorescent street lighting Dr. Dickerson said that there was nothing to compare with the excellent installations in this country. He and his colleague, Mr. Houser, were going back greatly stimulated by what they had seen and more firmly convinced than ever of the future widespread use of this type of lighting. He did, however, mention a very interesting development, viz., the production of a special 72-in. fluorescent lamp taking one ampere and so designed that the light output increased as the ambient temperature fell, so that the maximum light was available when it was most needed. He concluded with a reference to street lighting columns and said that in business streets and traffic routes, concrete or metal poles were

generally employed, pressed steel being the most popular, although the use of aluminium was rapidly extending.

In opening the discussion Mr. J. M. Waldram managed to convey, although not in so many words, his conviction that British street lighting would stand up to any comparison with that on the other side of the Atlantic and emerge triumphantly, but attempts made in this country to correlate traffic accident statistics with street lighting had always failed, and this experience was borne out by that of other countries, as reported to the International Commission on Illumination. He suggested an experiment which, as far as he knew, had never been tried. This was to take a fairly large area, lighted satisfactorily, and find the accident rate between the hours of, say, six and seven in the evening throughout the year. A comparison of the figures for that part of the year in which this was a dark period with those for which it was a daylight period should give very useful information since all the other conditions were more or less constant.

Mr. R. Parker, of Aberdeen, said that, while traffic safety should be the first concern of the public lighting engineer, a good daylight appearance of the installation was also important. Mr. L. Gaynard, of Paris, confirmed what Mr. Waldram had said about the lack of statistical correlation between traffic-accident rate and street lighting.

Mr. A. G. Penny, of the General Electric Company, referred to the colour-corrected h.p.m.v. lamp, saying that it provided the street-lighting engineer with a high efficiency source of acceptable colour and in a size

which enabled him to use a smaller fitting than that necessary for fluorescent lamps.

Mr. L. R. Osgood said that he was somewhat apprehensive about the emphasis being laid on the connection between street lighting and road safety. He was afraid that the public lighting engineer might become the whipping boy of the road accident situation. No doubt he had a considerable responsibility in the matter, but he should not be blamed automatically for every accident that occurred after dark.

In his reply Dr. Dickerson stressed the need to bring home to the general public the need for better street lighting and the high cost of bad lighting. He then asked his colleague, Mr. P. H. Houser, to deal with some of the technical points that had been raised. Perhaps the most interesting new information elicited was that conveyed by a slide showing the performance of the new fluorescent lamp referred to in the paper. The curve relating temperature and light output had a maximum at an ambient temperature close to the freezing-point.

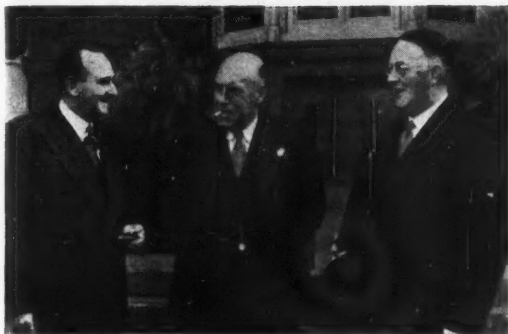
The vote of thanks was proposed by Mr. E. C. Lennox, a Past-President of the A.P.L.E.

The Right Policy for Street Lighting by Gas

At the session on Thursday morning, Mr. Norman Hudson, M.B.E., Chief Commercial Officer of the North Eastern Gas Board, read a paper in which, under the title "Street Lighting—A Wise Compromise," he stated clearly the policy that should guide local authorities in their attitude to the gas street lighting in their areas. He began by pointing out that if the reduction in the number of gas-lighted street lamps continued in the immediate future at the same rate as



(Left to right) Dr. A. F. Dickerson, of the General Electric Company of America; Mr. C. W. M. Phillips, Mr. P. H. Houser, also of the G.E.C. of America, and Mr. H. E. G. Watts.



(Left to right) Mr. H. Carpenter, Mr. P. Richbell, and Mr. E. Howard.

in 1951 there would still be nearly 500,000 such lamps in service at the end of 1961. Even if the rate of reduction were doubled there would still be more than 300,000 gas street lamps in use in 10 years' time, while during the same period some £20,000,000 would be spent on the gas supplied for street-lighting purposes, and it was incumbent on local authorities to see that this money was used to the best advantage.

From these facts Mr. Hudson drew some very important conclusions. In the first place, the use of modern equipment would give the same amount of light as that now obtained, at an average saving of at least 20 per cent. in the gas consumed. It followed that the correct short-term policy was to carry out conversions as rapidly as possible and, to this end, to strike a proper balance between expenditure on traffic routes and that on side roads. The long-term policy he illustrated by reference to recent conversions carried out in the Borough of Holborn. In a number of important streets new lighting with a mounting height of 14 to 15 ft. and a spacing of about 60 to 70 ft. gave excellent results with a lumen output of some 3,000 to 3,500 lumens per 100 ft. of roadway.

Mr. Hudson then put forward a plea for relating the mounting height to the width of the roadway, and made reference to the incongruity of 25-ft. columns on a narrow traffic route. The final part of his paper contained two charts; one showed the cost of converting gas lighting to electric lighting as compared with the cost of improving the gas-lighting installation, the other compared the annual running costs of old and modern gas lanterns (a) for all-night lighting, and (b) for half-night lighting.

The first speaker in the discussion was

Mr. R. H. Bone, chairman of the Scottish Gas Board, who said that there seemed to be an impression abroad that gas area boards were not interested in retaining the street-lighting load, probably because of price policies in the past. Maintenance varied greatly in different areas, and the supply authority was always blamed for any faults. He agreed with the author that it was a very short-sighted policy to retain out-of-date equipment because it had been decided to carry out a conversion at some future date; that date might be in the far-distant future, and meanwhile money was being wasted.

Mr. L. A. Doxey said that it was not always possible to carry out improvements as suggested by the author. Sometimes a very considerable expenditure would result in an installation which, although improved, would still be very unsatisfactory.

Mr. W. Robinson, of the British Electrical Development Association, speaking as a councillor of a metropolitan borough, said there was always a great temptation to avoid capital expenditure, but this was very short sighted if it meant high maintenance costs. The author had criticised the Code of Practice for recommending a mounting height of 25 ft., but in Holborn the streets referred to in the paper had a very short spacing. It had always to be remembered that the code was not in any way restrictive, and good results could sometimes be obtained along other lines.

Mr. E. A. Slight, of Wallasey, said that ratepayers were very indifferent to the lighting on residential roads, whereas the motorist was very insistent on good lighting for traffic routes. It was almost impossible to spend money on lighting side roads except out of revenue.

Mr. H. Cork, of Manchester, said that in

side roads only about 30 per cent. of the posts were in the correct positions, and, therefore, conversion would be an expensive matter if the results were to be satisfactory.

Mr. E. C. Lennox referred to the Ridley Report, and said that it was necessary to take a national view of the fuel situation; not only could the same number of lumens be obtained from much less coal by the use of electricity but the grade of coal used was much inferior. This, however, was contradicted by Mr. Pryce-Jones, who pointed out that, while it was true that inferior coal could be used for electrical generation, in fact the supply of such coal was very much less than the total consumption of the power stations.

Mr. Hudson then replied, and expressed some apprehension about the Code of Practice for Side-street Lighting. When this appeared he was afraid that it would be applied rigidly whenever sanction for expenditure was sought. In reply to a question by Mr. J. Wilson, of Paisley, he said that central control was not now used for gas street lighting. With reference to the most economical use of the country's resources, he pointed out that the street-lighting load inevitably contributed to the peak load of the electricity supply and therefore necessitated the installation of extra power plant.

A vote of thanks to the author was proposed by Mr. A. S. Tapsfield, a past president of the Association, and was carried by acclamation.

Annual Luncheon

The annual luncheon of the Association was held on the Thursday at the Cairn Hydro Hotel. The after-luncheon speeches were opened by the vice-president, Mr. C. C. Smith, who proposed a combined toast to the Corporation of Harrogate and the guests. The reply was made by the Mayor of Harrogate, Councillor A. V. Milton, J.P.

The principal speaker was Major-General B. K. Young, Director-General of the Royal Society for the Prevention of Accidents, who proposed the toast of the Association of Public Lighting Engineers. In his remarks, he spoke of the high rate of accidents on the roads, and pointed out that this country had the greatest density of road vehicles per mile of road system of any country in the world. The provision of adequate lighting in the streets and roads was, he said, an economic necessity. He said that during 1952 additional steps had

been taken to improve safety on the roads, and there were indications that these methods were being met with some success. He urged the members of the A.P.L.E. to co-operate to the fullest extent.

An expression of thanks to Major-General Young was given by the president.

The Design, Manufacture and Erection of Concrete Lighting Columns

The last Session of the Conference was, as usual, devoted to a paper concerned with some material of interest and importance to the public lighting engineer. On this occasion the material was concrete and the paper, under the title quoted above, was by Dr. D. F. Orchard, of the Cement and Concrete Association. He first referred to the requirements which a street lighting column was called upon to fulfil, on the technical side the provisions of several British Standards, and on the aesthetic side the judgment of the Council for Industrial Design, which had taken over the work of the Royal Fine Arts Commission in this matter.

The design and manufacture of a column, said the author, depended on whether the concrete was to be compacted by vibration or by spinning and whether the tensile stresses were to be taken by simple mild steel reinforcement, or by the comparatively new process of pre-stressing. In this the concrete was cast round high tensile steel wires which were held in a stretched condition until the concrete had set sufficiently to grip the wires. The stretching force was then released with the result that the concrete was in a state of compression and so could take tensile forces without the development of hair cracks. This, said Dr. Orchard, combined with the higher quality of concrete used for pre-stressed columns, should result in better protection of the reinforcement and less likelihood of any premature deterioration.

The author gave a great deal of technical information about the mechanical stresses to which columns were subjected and about details of construction, with particular reference to the pre-stressed columns, one 15 ft. and the other 25 ft., designed specially for the Harlow Development Corporation. He dealt also with bracket arms and with special roots designed for use in situations where there was much obstruction by underground cables and the like. He mentioned the various ways in which it was possible to dispose of the control gear for the lamp and strongly advocated the adoption of a



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smaller base compartment than that now customary. The use of an opening only 4 in. wide would enable a very slender pole to be designed and it would accommodate most of the control gear now being made. He advocated housing the auxiliary apparatus for discharge lamps in the lantern.

The second half of Dr. Orchard's paper

for extracting the water and so accelerating the setting process. A fairly rich mix was generally used. Surface finishing was done by grinding, either wet or dry. Finally Dr. Orchard described methods of testing and various matters concerned with the erection of columns.

Mr. R. Parker, of Aberdeen, opened the



General view of the display of columns and lanterns.

contained descriptions of the actual processes of manufacture. In most cases the mould was horizontal and the concrete was pumped into it. When the spinning process was used, the water escaped into the central hole formed. Steam curing of the concrete was sometimes employed to reduce the setting time and so enable one mould to do more duty. As moulds were very expensive, this was an important consideration. A process not mentioned in the printed paper but referred to by Dr. Orchard in his verbal presentation, was the use of a vacuum

discussion by asking a number of questions about the pre-stressed column. What was the effect on the price? Was the weight for a given strength decreased? What was the effect of impact? He understood that, unlike an ordinary reinforced concrete column, there was danger that it would completely collapse if struck by a vehicle. Turning to matters of design, he thought that it was very often the bracket arm that caused criticism, and he suggested a much greater use of aluminium for this purpose.

Following up Mr. Parker's earlier remarks,

a representative of Concrete Utilities, Limited, said that a pre-stressed column was inferior to a reinforced column as far as resistance to impact was concerned, and he described comparative tests which bore out this statement.

Mr. H. Carpenter also described some comparative tests of the effect of impact and said that the pre-stressed column had been found no weaker than the ordinary reinforced concrete column. He had just received news of an accident at Blackpool which appeared to confirm this conclusion.

The author, in his reply, said that it was not correct to think of the pre-stressed column as a rival to the ordinary column. Each had its special sphere of usefulness. The pre-stressed column might be described as rather more "brittle," but it did not develop hair cracks and so its life would probably be longer. The difference in weight for equal strength was comparatively small. If produced in quantity it would be slightly cheaper. With regard to the use of aluminium brackets, he said that tests were in progress to find out if there was any truth in the impression that aluminium in contact

with concrete was liable to corrosion; so far the results seemed to indicate that the effect, if present at all, was quite small.

Mr. J. M. Waldram proposed a vote of thanks to the author, and in so doing referred to the way in which concrete columns had recently been anathematised by the architects. He said that when he opened his newspaper on Tuesday morning he felt it was time that the lighting engineer criticised the architects for the bizarre backgrounds which they provided for the engineer's really very beautiful columns.

Conclusion

The final business of the Friday morning was a general meeting to conclude the conference, and at which the President was able to express his own and the Association's appreciation to those who had contributed to the success of the meeting.

Social events during the meeting included a civic reception and a reception by the President. Special arrangements were also made for the entertainment of the ladies.

The 1953 Conference will probably be held in Liverpool.

Exhibition of Street Lighting Apparatus

The exhibition of street lighting apparatus shown in connection with the A.P.L.E. Conference was of considerable interest and was, perhaps, even more comprehensive than in previous years.

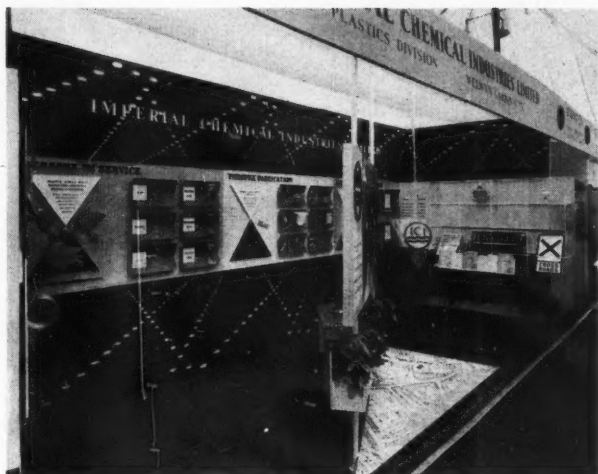
Electric Lanterns

An innovation shown by *Crompton Parkinson, Ltd.*, in this section was the "Concept," a combined lantern and bracket arm. Both column and street lighting lantern designers have appreciated the need for improved appearance with consequent improvements in standards of design; yet there is still much criticism of contemporary equipment. One reason for this criticism is that in many cases the choice of the purchaser is restricted to columns and lanterns that have been designed independently. The column alone is of pleasing lines; the lantern alone is of good appearance; but together there is discord. Sometimes there is a lack of proportion between column and lantern. Sometimes the styles of lantern and column conflict. Sometimes the proportion is right and the style is right but

there is no continuity of line. Quite often with concrete columns the change of medium from concrete to the metal of the lantern emphasises any incongruity in the combination.

The Crompton "Concept" is described as the conception of column and lantern as one architectural composition. The treatment of column and lantern as one composition makes possible the proportion between column and lantern and the continuity of line and medium desirable for good appearance. Periodic painting is also eliminated and maintenance is reduced to the replacement of lamps and the occasional cleaning of the optical glass or plastic. Crompton Parkinson announce two forms of the "Concept." The "Concept 1" is for side-road lighting with tungsten (100/200

I.C.I. (Plastics Division) Stand, the theme of which was the organisation's technical service to the lighting industry.



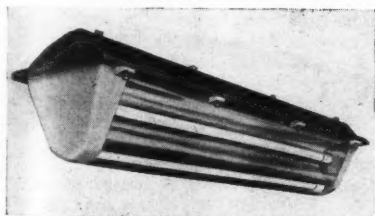
watt) or mercury lamps (80/125 watt). A crystal prismatic glass bowl supplied for light control is attached to a concrete head developed from the concrete bracket arm. The only exposed metal work is a narrow ring, between glass and concrete, cast from an aluminium alloy highly resistant to corrosion. This ring requires no painting in service. The bowl assembly can be supplied for use with Concrete Utilities "Estate Minor" columns with special brackets of either the Arc or Swan Neck type giving a height of 15 ft. to light source.

The "Concept 2" is for main-road lighting with either 85-watt or 140-watt sodium lamps. Light control is by means of "Perspex" prismatic plates sealed to the inside of a self-cleaning open "Perspex" bowl. This bowl is attached to a concrete head developed from the concrete bracket so that

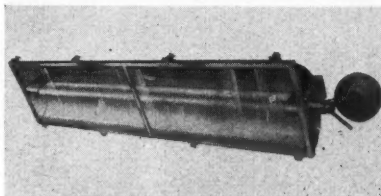
there is no exposed metalwork other than the lampholder and lamp supports within the bowl. If required, a hinged attachment with a "Perspex" dish can be supplied for attachment to the open "Perspex" bowl to give complete enclosure of the lamp against dust and weather. The bowl assembly for the "Concept 2" can be supplied for use with Concrete Utilities 3D or 3DN columns with special Arc 11 brackets giving a height of 25 ft. to light source.

Amongst the wide range of lanterns shown by the *Revo Electric Company, Ltd.*, was a new fluorescent lantern, C13740, designed for wall mounting or as a floodlit unit. Other lanterns shown by this firm included the well-known "Sol-Etern" and "Silver-blue" lanterns.

Metropolitan-Vickers Electrical Co., Ltd., showed the "SO Fifty-Two" side-entry open-



Mazda three-lamp fluorescent fitting for Group "A" roads.



Revo twin lamp 5-ft. fitting for wall mounting.



The B.T.H. Company's Stand.

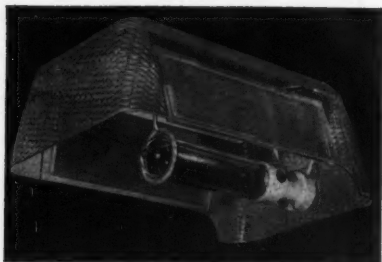
type lantern for 85/140-watt sodium discharge lamps. This type of lantern is also now available in the smaller size for 45/60-watt lamps, and both sizes can be supplied for top entry. Also shown was a lantern which the company introduced last year, the "Trafford 11," for use with 250- or 400-watt horizontally burning mercury vapour lamps with a magnetic arc control device.

Emphasis on the Philips Electrical Ltd. stand was on sodium lighting, with special reference to its efficiency and its contribution to road safety. A new item of particular interest for Coronation year was a new floodlight, the "Weybridge," specially designed for the Philips "Altrilux" internal reflector lamp.

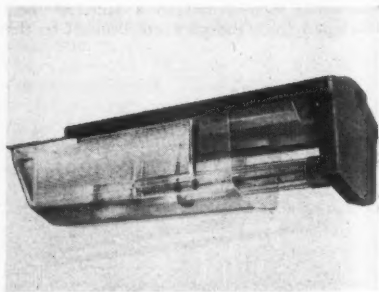
A modified sodium cylindrical refractor lantern and two new designs of post top

lantern were among the exhibits by *Holophane Ltd.* The new cylindrical refractor assembly, with its prisms protected on the interior surface, presents a smooth exterior for ease of maintenance and controls the entire light emission from the sodium lamp, so providing a higher standard of performance than has previously been achieved. Rotation of the refractor enables the correct angle of incidence of the main beams to the road surface to be maintained on all road gradients. The two post top lanterns are for use with either tungsten filament or sodium lamps. Other Holophane lanterns were also exhibited.

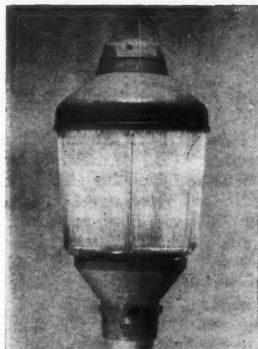
On the *Ediswan* stand was a totally enclosed SSA/1 lantern for the accommodation of a horizontally operated sodium electric discharge lamp. This lantern is made



G.E.C. plastic open lantern for sodium lamps.



Ediswan sodium lantern with "Perspex" enclosure forward.



*Holophane
post top
lantern for
use with
sodium
lamps.*

in two sizes suitable for group "A" and "B" applications and incorporates a unique method of securing the "Perspex" enclosure, with its sealed refractor plates, to the housing. This feature provides all the advantages associated with the use of a "Perspex" enclosure in place of glass and the self-supporting sliding action minimises the risk of breakage whilst servicing is being carried out under adverse conditions. For group "B" road lighting an open type lantern was displayed. Its ideal application is for secondary roads in towns, on housing estates, work yards, etc. The unit can be supplied with either a glass or "Perspex" globe as desired. Other lanterns from the Ediswan range were also on show.

Three new street lighting lanterns were among the lamps and lighting equipment shown by the *British Thomson-Houston Co., Ltd.* There was a new lantern for group "A" roads available for operation with two or three 80-watt 5-ft. fluorescent lamps. The lamps and three associated polished anodised aluminium reflectors are mounted to form a single optical system giving excellent lighting control. The main chassis of the lantern is of steel with a pyraluminised aluminium canopy and a "Perspex" cover-bowl diffused at each end. Instant-start lamp auxiliary gear is mounted on removable trays in the body of the lantern, and internal cantilever bracket mounting gives improved daylight appearance.

Of the two new sodium lanterns exhibited for the first time, the open type shows a greater departure from previous models. Constructed largely of "Perspex," it has built-in refractor side panels and a flexible, moisture-proof, rubber lampholder. Two designs cater for either top- or side-entry

mounting. The enclosed lantern is so designed that the lamp, the anodised aluminium reflector and the side panels are mounted to form a single optical unit which is completely enclosed in a clear "Perspex" weatherproof cover. It is made to take either side- or top-entry mounting.

The *General Electric Co., Ltd.*, showed representative lanterns selected from a much wider available range. A noteworthy feature of the models shown was the increasing use of "Perspex" and of die-cast alloys in lantern construction.

After improving main road lighting many authorities are turning their attention to the lighting of side streets. It is generally agreed that post-top lanterns are more pleasing than those supported on brackets, and the Z.5640 and Z.5630 post-top lanterns were on the stand, the latter making its first appearance. The Z.8441 vertical post-top lantern for four 2-ft. fluorescent tubes was also shown, together with Z.8243/4, its horizontal counterpart for two lamps.

Sodium group B lanterns included Z.9446, an enclosed lantern for 45-watt and 60-watt lamps burned horizontally in a "Perspex" dish to which are bonded "Perspex" refractor plates. Another newcomer to the range, the all-plastic Z.9720 lantern, is an open lantern for small sodium lamps.

The principal exhibits of *Falk, Stadelmann and Co., Ltd.*, were the "Fulmar" refractor lanterns for horizontally burning discharge



The Crompton "Concept 1"



One of the range of Stanton columns for Group "A" roads.

lamps. Hitherto the lantern for group "A" roads has been available with side entry only. An additional lantern, exhibited for the first time, had a top entry screwed either 1-in. or 1½-in. B.S.P. This lantern is designed for use with any standard steel or concrete column and will be specially suitable for use with existing pendant outlet columns, which have previously carried a top-entry lantern. Provision is made on the lantern to divert any moisture entering through the bracket without affecting the lantern or lamp in any way.

There are now three lanterns in the "Fulmar" range. Two for 85/140-watt lamps for group "A" roads, one model having a 1½-in. side entry and the other top entry, and a top-entry model for group "B" roads for 45/60-watt lamps. All can be connected without any alteration or adaptation.

Included in the exhibits of *Siemens Electric*



A Stewart and Lloyds tubular steel column for main roads.

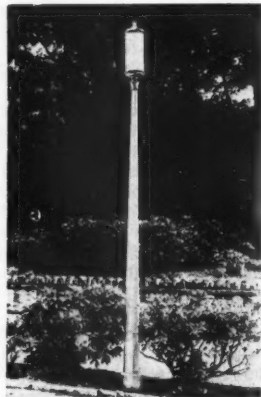
Lamps and Supplies, Ltd., was a newly designed fluorescent post-top fitting for 2-ft. fluorescent lamps. Other lanterns shown included the Wilton-Sieray 3480 for group "A" roads and two types of Wilton-Sieray 240 lantern for group "B" installations.

Other electric lanterns were shown by the *Wardle Engineering Co., Ltd.*, *Victor Products (Wallsend), Ltd.*, the *Brighton Lighting and Electrical Engineering Co., Ltd.*, *Engineering and Lighting Equipment Co., Ltd.*, and *Thorn Electrical Industries, Ltd.*

Gas Lanterns

In this gas section, the *Gas Council's* stand formed the central feature. The stand demonstrated the efficient maintenance, replacement and re-grouping of existing installations of gas lighting on public high-

An "Adas-tra" circular column for 15-ft. mounting height with vertical lantern.



ways. This theme was illustrated by actual equipment, models and photographs. The council was also responsible for the platform display which illustrated the paper on the subject presented by Mr. Norman Hudson, Chief Commercial Officer of the North Eastern Gas Board.

Parkinson and Cowan (Gas Meters), Ltd., were showing their "Maxilla" lanterns for group "B" lighting and *William Edgar and Son, Ltd.*, showed equipment for gas street lighting as well as a range of secondary lighting equipment.

William Sugg and Co., Ltd., showed their range of improved efficiency modern gas lanterns, illuminators for traffic signs and a low-pressure gas-operated flashing pedestrian crossing beacon.

(Continued on Page 413)

Columns

In the outdoor display *Concrete Utilities, Ltd.*, exhibited a selection of lighting columns comprised of four group "A" and two group "B." Their display included the latest design for installations using fluorescent lighting and for types used on housing estates.

Poles, Ltd., were showing their "Adastra" galvanised sectional steel lighting columns. These columns have clean-cut lines and are all protected against corrosion and deterioration by a galvanising process after manufacture is complete. The columns exhibited were of circular and hexagonal types covering group "A" and group "B" lighting.

Stewart and Lloyds, Ltd., showed a selection of their standard tubular steel street lighting columns for group "A" and group "B" roads. Columns shown were of the plain circular and fluted shaft types.

Spun concrete lighting columns were shown by the *Stanton Ironworks Co., Ltd.*, whose display included four new designs of 25-ft. columns and brackets. A selection of pre-stressed columns was also shown. Other manufacturers in this section were *Costain Concrete Co., Ltd.*, *Tarslag, Ltd.*, *Springbank Quarry Co., Ltd.*, and *Spun Concrete, Ltd.*

Control Equipment

Amongst other exhibits in their display, *Sangamo Weston, Ltd.*, showed their latest synchronous motor-driven type of solar dial switch.

Anticipating the eventual necessity for flashing lighting in the orange lights at zebra crossings, *Venner, Ltd.*, have been experimenting to find the most suitable time switch for this type of lighting control. Their experimental work has now resulted in the production of the Venner zebra switch. The control unit is driven by a Venner high-torque synchronous motor consuming only about 1½ watts. It opens and closes a pair of contacts at the required intervals. The contacts are tungsten-tipped and long life has been made one of the first considerations in the design of the new switch. The unit is of a plug-in design to ensure easy and immediate replacement should this ever be necessary. The zebra switch is available, complete in a cast metal case, specially designed for mounting on top of existing beacons and has sufficient space for accommodating, in addition to the flasher unit, either a synchronous or

electrically wound spring reserve time switch and double-pole fuses.

A stand which attracted some attention was that of *Bright, Son and Co. (Clerkenwell), Ltd.*, where that firm's facilities for repairing time switches and controllers were exhibited. The electronic timing machines which were demonstrated were very popular with delegates, many of whom had their watches tested.

Amongst the many *Horstmann Gear Co., Ltd.*, switches seen was an electrically wound model with spring reserve. This is claimed to be the smallest and most compact model of its type on the market.

Other exhibitors of control equipment were the *Automatic Telephone and Electric Co., Ltd.*, *Aspec (London), Ltd.*, *Metropolitan Gas Meters, Ltd.*, *Rheostatic Co., Ltd.*, *Automatic Light Controlling Co., Ltd.*, and *Standard Telephones and Cables, Ltd.*

Bollards and Tower Wagons

Interesting exhibits shown by *Gowshall, Ltd.*, included illuminated guardposts and the new "Signlite" lighting units for externally illuminating all traffic signs. Also shown were cast-iron island sites which can be assembled quickly and easily to give continuous service. Centre islands and lighting columns, tubular steel posts, flood-lighting fittings and acrylic plastic beacon globes were also exhibited.

The *Brighton Lighting and Electrical Engineering Co., Ltd.*, showed pedestrian crossing beacons; bollards were also shown by *Franco Traffic Signs, Ltd.*

Four Bedford tower wagons were exhibited with bodies and equipment by the *Eagle Engineering Co., Ltd.* Three of the tower wagons were mounted on the 3-ton L.W.B. Bedford chassis cab, the fourth on a 4-ton L.W.B. chassis. The four-ton model has a fully enclosed linesman's cab integral with the driver's cab, fitted with a workbench, lockers, a 20-gallon water tank and a sink. This model also has jib and winch equipment for lifting loads on to the platform.

Tower ladders were shown by *Shaftesbury Ladders, Ltd.*, *John Kerr and Co. (M/C), Ltd.*, *John Gibson and Son, Ltd.*, *Eagle Engineering Co., Ltd.*, *R. A. Lister and Co., Ltd.*, and *Ford Motor Co., Ltd.*

Other exhibitors included *Alan Taylor (Engineers), Ltd.*, *Wokingham Plastics, Ltd.*, *C. H. Kempton and Co., Ltd.*, *North Midlands Engineering Co., Ltd.*, *Whelmer Incandescent Mantle Co., Ltd.*, *Pilkington Bros., Ltd.*, *British Electrical Development Association.*

I.E.S. ACTIVITIES

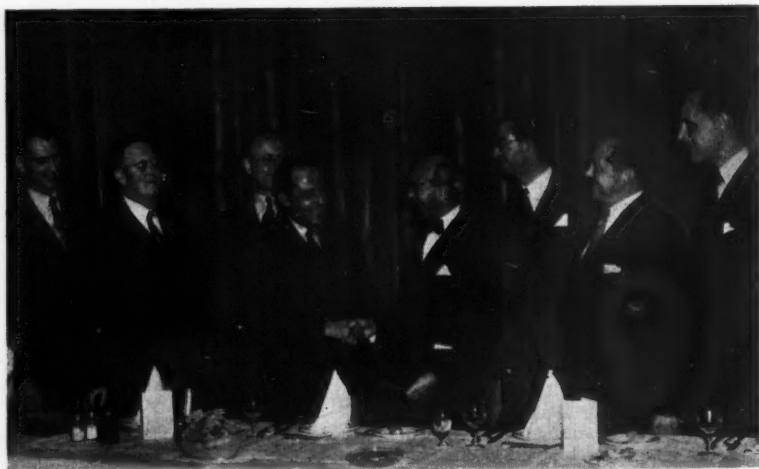
Leeds Centre

The Leeds Centre opened the new session with a dinner on September 26 when the retiring chairman, Mr. J. Sewell, handed over office to Mr. J. H. Weaver. The guests included the incoming president of the Society, Dr. W. J. Wellwood Ferguson, the I.E.S. secretary, Mr. G. F. Cole, Mr. Harry Hewitt and Mr. T. L. Robinson, chairman and hon. secretary respectively of the Manchester Centre.

A vote of thanks to the retiring chairman was proposed by Mr. L. A. Doxey, after which Mr. Sewell replied and introduced Mr. Weaver. In returning thanks for his election to office Mr. Weaver referred to his own connection with the lighting industry and to the difficulties sometimes experienced by electrical contractors in putting into practice the plans of the lighting engineer. He said it was quite obvious to those engaged in lighting installation that there should be greater collaboration between those concerned with the various services installed in

buildings and urged members to make greater efforts to interest electrical contractors in the work of the I.E.S. He also warmly welcomed on behalf of the Centre the president and secretary and other guests.

Mr. Farthing, of the Yorkshire Electricity Board, replied on behalf of the visitors. He said that there were many specialist societies and institutions but there were very few that provided a means for discussion between interested parties. This the I.E.S. does most successfully in the case of lighting where, the interests included not only the lighting engineer but the electrical contractor, the supply industry, the optical and medical professions and, in fact, a whole host of people who were concerned with the provision and the use of lighting. The I.E.S., he said, performs an admirable task in disseminating information in a form understandable to and usable by all. Mr. Farthing also applied the same remarks to *Light and Lighting* which, he said, dealt with a wide variety of subjects all of importance to those concerned



The induction of Mr. P. L. Ross as Chairman of the Nottingham Centre. (Left-right) Messrs. K. J. Goddard (Joint Hon. Sec.), E. Howard (President of the A.P.L.E.), E. C. Lennox (a vice-President), P. L. Ross, C. S. Caunt (retiring Chairman), G. F. Cole (Secretary), N. C. Slater (vice-Chairman), and H. J. Slater (Joint Hon. Sec.)

with lighting in an attractive and readable form.

Dr. Ferguson expressed the thanks of himself and the secretary at being present at the opening meeting of the Leeds Centre. He said that though he was unable to disclose in advance the text of his presidential address one of the points he intended to make was that however much thought and work is put into a lighting installation unless the result was pleasing to the eye the result would be unsatisfactory. He said he was pleased to hear the comments of both Mr. Weaver and Mr. Farthing on the need for the widest possible representation of interests within the society as he felt that all expressions of opinion must be considered. He suggested that people of all interests should be invited to attend and speak at I.E.S. meetings whether they were members of the Society or not.

Nottingham Centre

The Centre was honoured by the presence of Mr. E. C. Lennox, a vice-president of the Society, and Mrs. Lennox, together with Mr. G. F. Cole, the secretary, and other distinguished guests, on Thursday, September

25, when, following the annual luncheon, Mr. P. L. Ross was inducted as chairman for the ensuing year. Mr. C. S. Caunt, the retiring chairman, paid tribute to the work that Mr. Ross had undertaken on behalf of the Centre in the past and wished Mr. Ross a happy year of office. He also thanked the joint hon. secretaries and other officers for the work they were doing for the Centre.

The toast of "The Guests" was proposed by the new chairman and in reply Mr. Lennox said how glad he was to visit Nottingham and congratulated the Centre on numbering amongst its founder members Mr. E. Howard, the City Lighting Engineer, who had only a few days previously been inducted as president of the Association of Public Lighting Engineers. Mr. Lennox went on to refer to the tremendous improvement in the lumen output of lamps within the last 30 or 40 years and stressed the need of good street lighting to combat the appalling number of road accidents after dark at the present time and said he felt that there should be some independent body who should be in a position to compile statistics on the subject.

Forthcoming I.E.S. Meetings

LONDON

November 11th

Sessional Meeting. Three short papers on Factory Lighting. (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

November 26th

Informal Meeting. Discussion on Home Lighting (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

CENTRES AND GROUPS

November 4th

STOKE-ON-TRENT.—"Planning an Industrial Lighting Scheme," by V. A. Heydon. (At the Lecture Hall, Midlands Electricity Board, 31, Kingsway, Stoke-on-Trent.) 6 p.m.

November 5th

EDINBURGH.—"On Planning Lighting Installations," by J. F. Roper. (At the Welfare Club Hall, 357, High Street, Edinburgh.) 7 p.m.

NEWCASTLE.—"The Architect's Approach to Artificial Lighting," by R. G. Cox. (At the Minor Durrant Hall, Oxford Street, Newcastle-on-Tyne, 1.) 6.15 p.m.

November 6th

BIRMINGHAM.—Ladies' Night.
GLASGOW.—"The Lighting of Shipyards," by J. S. McCulloch. (At the Institute of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 6.30 p.m.

NOTTINGHAM.—"The Effect of Light in the Growth and Development of Plants," by Miss D. Vince. (At the Demonstration Theatre of the East Midlands Electricity Board, Smithy Row, Nottingham.) 6 p.m.

BRADFORD.—"Glass and its Manufacture," by F. Mathers. (At the Yorkshire Electricity Board, 45-53, Sunbridge Road, Bradford.) 7.30 p.m.

EXETER.—Brains Trust in conjunction with members of the E.A.W. (At the Providence Hall, Northernhay Street, Exeter.) 7 p.m.

November 7th

BATH AND BRISTOL.—Brains Trust in conjunction with members of the E.A.W. (At the South Western Electricity Board Lecture Theatre, Colston Avenue, Bristol.) 6.15 p.m.

HUDDERSFIELD.—"Modern Aerodrome Lighting," by J. W. Morse. (At the Electricity Showroom, Market Street, Huddersfield.) 7.15 p.m.

November 10th

SHEFFIELD.—"The Application of Modern Flash Discharge Tubes," by C. R. Bicknell. (At the Medical Library, Sheffield University, Western Bank, Sheffield, 10.) 6.30 p.m.

November 12th

MANCHESTER.—Annual Dinner.

November 18th

LIVERPOOL.—"The Design of Interior Lighting Equipment," by L. H. Hubble. (Joint Meeting with the Liverpool Architectural Society.) (At the Lecture Theatre of the Merseyside and North Wales Electricity Board's Service Centre, Whitechapel, Liverpool, 1.) 6 p.m.

November 19th

NORTH LANCASHIRE.—"Industrial Lighting," by W. Imrie-Smith. (At the Preston and District Chamber of Commerce, 49a, Fishergate, Preston.) 7.15 p.m.

TEES-SIDE.—"Flash Discharge Tubes." (At the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.) 6.30 p.m.

November 20th

GLOUCESTER AND CHELTENHAM.—"Lighting in Relation to Safety and Vision," by E. W. Murray. (At the General Electric Co. Ltd., 2, St. Aldgate Street, Gloucester.) 6.15 p.m.

November 24th

LEEDS.—"Brightness Engineering," by W. Robinson. (At the Lighting Service Bureau, 24, Aire Street, Leeds, 1.) 6.15 p.m.

LEICESTER.—"Black Light, its Effect and Applications," by H. L. Privett. (At the Demonstration Theatre of the East Midlands Electricity Board, Charles Street, Leicester.) 6.30 p.m.

November 25th

CARDIFF.—"Lighting of Modern Ocean Liners," by T. Catten. (At the Demonstration Theatre of the South Wales Electricity Board.) 5.45 p.m.

November 26th

SWANSEA.—"Lighting of Modern Ocean Liners," by T. Catten. (Joint Meeting with the E.A.W.) (At the Minor Hall, Y.M.C.A., Swansea.) 6 p.m.

POSTSCRIPT

Some months ago I referred, in these columns, to trials which were being made of different lights for indicating the presence of "zebra" pedestrian crossings. The decision to retain the familiar Belisha beacons at these crossings was subsequently announced in the House, and the Minister of Transport has now advised local authorities that the beacons should have flashing lights both by day and night. The beacons at each crossing are to flash in unison, but they should not flash in step with the beacons of neighbouring crossings on the same road. The Minister is concerned for the avoidance "of irritation to people living or working close by," and therefore advises that "where the beacons are so close to premises that the flashing is seriously disturbing and causes persistent complaints the beacons should be fitted with suitable screens, though care should be taken that the screens do not impair drivers' views. . . . In some places to avoid unnecessary annoyance to residents at night it may be desirable to extinguish the lights in the beacons during part of the night when there are very few pedestrians about." Apparently, however, when the lighting of beacons becomes compulsory, crossings will be deprived of their legal status so long as the lights are extinguished. There is a suggestion that steady lights may be used at places where the general standard of illumination at night is such that they would show clearly and be sufficiently arresting, but the Minister hopes that they will be adopted only in exceptional circumstances. It seems most desirable that there should be only one unequivocal luminous sign of the presence of a "zebra" crossing, so I hope flashing beacons will be used without exception and that nearby residents will draw their curtains at night if they would otherwise be disturbed by the flashing.

One of the "dailies" recently reported that Nottingham—described as a "city of pretty girls"—had banned the use of sodium street-lighting in the city centre because it would make the girls look half-dead. This may be a very good reason for the ban. A cynic has said that all women are alike in the dark, but, so long as they can be seen, Eros forbid that they should be alike in looking half-dead! But what of the Endymions of Nottingham? Could their

appearance in sodium lighting have warmed the cold heart of Selene, or the, presumably less cold hearts of the pretty girls? Perhaps it was masculine vanity no less than consideration for the fair sex that prompted the ban.

I see, from the September issue of "Illuminating Engineering," that the brightness difference "concept" has just been "re-discovered" by the authors of a paper presented at the 1952 National Technical Conference of the American I.E.S. The idea that the illumination for equal facility of seeing any particular contrast should be such that the contrast presents the same brightness difference, no matter by what combination of background and object reflectances the contrast is obtained, was put forward in 1933 by A. W. Beuttell—a past-president of the British I.E.S.—in a paper he read to the Society under the title, "An Analytical Basis for a Lighting Code." Beuttell went still further and suggested, as a basis for research, that compensation for a difference in contrast between otherwise similar tasks might be achieved by so illuminating the tasks that each would present the same brightness difference. The validity of Beuttell's concept was subsequently tested in the visual performance studies made by H. C. Weston—another past-president of the British I.E.S.—whose work was published in a paper given to the Society in 1943, entitled "Proposals for a New Lighting Code," as well as in Report No. 87 of the Industrial Health Research Board. Although these studies showed that, even when a constant brightness difference was maintained, differences of contrast resulted in differences of performance, the latter were less than they would otherwise have been. The brightness difference concept is apparent in the I.E.S. Code illumination chart, which has become so familiar since its debut in 1945. The further applications of the brightness difference concept which are suggested in the American paper seem to me to require more critical consideration.

Talking of past-presidents of the I.E.S., it was very pleasant to see so many of them at the meeting at the Royal Institution last month, when they received their replicas of the presidential insignia.

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